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UNITED STATES OF AMERICA
POSTAL REGULATORY COMMISSION
WASHINGTON, DC 20268-0001

Periodic Reporting
(UPS Proposals One, Two, and Three)

Docket No. RM2016-2

NOTICE OF ERRATA

(Issued October 19, 2016)

In Order No. 3506, Order Concerning United Parcel Service, Inc.'s Proposed Changes to Postal Service Costing Methodologies (UPS Proposals One, Two, and Three), issued on September 9, 2016, the following changes should be made:

Page 2, footnote 3: replace "do not vary directly with volume" with "are not volume-variable costs." The complete sentence should read: "As discussed in detail below, inframarginal costs are variable costs that are not volume-variable costs."

Page 10, lines 8-10: replace "do not vary directly with volume" with "are not volume-variable costs. Panzar Comments, Exhibit 2 at 11." The complete sentence should read: "Inframarginal costs are variable costs that are not volume-variable costs. Panzar Comments, Exhibit 2 at 11."

Page 19, footnote 34: delete "product costs that are variable but do not vary directly with volume. This amounts to." The complete sentence should read: "The generally agreed upon definition of inframarginal costs is all variable costs less volume-variable costs."

Page 35, lines 10-11: delete "represent product costs that," and replace "but do not vary directly with volume" with "costs that are not volume-variable costs." The complete sentence should read: "Inframarginal costs are variable costs that are not volume-

variable costs."

Page 35, last sentence on the page: replace "The difference between the higher marginal cost of each piece produced before the last piece and the marginal cost of the last piece is the inframarginal cost." with "The sum of the differences between the marginal cost of each piece and the marginal cost of the last piece is the inframarginal cost." Add a footnote after the sentence to read: "This can be represented by the formula $\sum_{i=1}^{n}(MC_i - MC_n)$, where *i* is a piece of mail. Notably, this formula demonstrates that the last piece of mail has zero inframarginal cost. This is consistent with the definition of inframarginal cost as the difference between variable and volume-variable cost, because the sum of the marginal cost of each piece is the variable cost, and the marginal cost of the last piece, multiplied by the number of pieces, is the volume-variable cost."

Included with this Notice is an updated version of Order No. 3506 that includes the changes identified above.

Stacy L. Ruble
Secretary

ORDER NO. 3506

UNITED STATES OF AMERICA
POSTAL REGULATORY COMMISSION
WASHINGTON, DC 20268-0001

Before Commissioners: Robert G. Taub, Acting Chairman;
Nanci E. Langley, Vice Chairman;
Mark Acton; and
Tony Hammond

Periodic Reporting
(UPS Proposals One, Two, and Three)

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ORDER CONCERNING UNITED PARCEL SERVICE, INC.'S PROPOSED CHANGES TO POSTAL SERVICE COSTING METHODOLOGIES (UPS PROPOSALS ONE, TWO, AND THREE)

Washington, DC 20268-0001
September 9, 2016 (Updated October 19, 2016)

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ORDER CONCERNING UNITED PARCEL SERVICE, INC.'S PROPOSED CHANGES TO POSTAL SERVICE COSTING METHODOLOGIES (UPS PROPOSALS ONE, TWO, AND THREE)

(Issued September 9, 2016)

I. INTRODUCTION

On October 8, 2015, the United Parcel Service, Inc. (UPS) filed a petition, pursuant to 39 C.F.R. § 3050.11, requesting consideration of Proposals One, Two, and Three, which seek to make changes to how the Postal Service accounts for the costs of its products in its periodic reports and the amount of the appropriate share of the institutional costs of the Postal Service that competitive products collectively must

cover.[1] To support its proposals, UPS filed a report created by Dr. Kevin Neels (Neels), an economic consultant, along with a non-public library reference.[2]

In Proposal One, UPS recommends that the Postal Service calculate and attribute inframarginal costs,[3] in addition to the currently attributed marginal costs, to individual products. Petition, Proposal One at 1. In Proposal Two, UPS recommends that certain costs currently identified as fixed be reclassified as fully or partially variable and subsequently attributed to individual products. Petition, Proposal Two at 1. In Proposal Three, UPS recommends that the Commission increase the "appropriate share" for competitive products to cover institutional costs pursuant to 39 U.S.C. § 3633(a)(3) from 5.5 percent[4] to 24.6 percent, which UPS states is the competitive products' 3-year trailing average of the share of total attributable costs. Petition, Proposal Three at 1.

As discussed in depth in the chapters that follow, the Commission declines to adopt Proposals One and Two.

The Commission does not adopt Proposal One because the record as provided by UPS and further developed by the parties and Commission does not support a finding that inframarginal costs can be attributed. Specifically, Proposal One fails to demonstrate that inframarginal costs are attributable through "reliably identified causal relationships." *See* 39 U.S.C. § 3622(c)(2). In addition, Proposal One does not

[1] Petition of United Parcel Service, Inc. for the Initiation of Proceedings to Make Changes to Postal Service Costing Methodologies, October 8, 2015 (Petition). Proposals One, Two, and Three are attached to the Petition.

[2] Petition, Report of Dr. Kevin Neels Concerning UPS Proposals One, Two, and Three (Neels Report); Notice of Filing of Library Reference UPS-RM2016-2-LR-NP1, October 8, 2015.

[3] As discussed in detail below, inframarginal costs are variable costs that are not volume-variable costs.

[4] *See* 39 C.F.R. § 3015.7(c). In a 2012 proceeding, the Commission, following a review, maintained this share at 5.5 percent. *See generally* Docket No. RM2012-3, Order Reviewing Competitive Products' Appropriate Share Contribution to Institutional Costs, August 23, 2012 (Order No. 1449).

"improve the quality, accuracy, or completeness of Postal Service data required by the Commission…" because it does not remedy a significant inaccuracy or significantly improve the quality, accuracy, or completeness of Postal Service data or the attribution of costs or revenues to products, nor, in the judgment of the Commission, is it otherwise necessitated by the public interest. *See* 39 U.S.C. § 3652(e).

In the course of its analysis of Proposal One, however, the Commission identifies additional costs that are reliably identified and causally related but not currently attributed, and represent a significant improvement over the current methodology. In this Order, the Commission adopts the incremental cost methodology to determine attributable costs. This results in the attribution of those inframarginal costs that meet the statutory requirements for cost attribution.

The Commission does not adopt Proposal Two because the supporting econometric analysis provided by UPS does not reliably identify the presence of hidden variable costs, at the enterprise level and the component level. *See* 39 U.S.C. § 3622(c)(2). Because the methodology presented in Proposal Two does not show a reliably identified causal relationship required to attribute the alleged "hidden variable costs" it cannot be an improvement over the existing methodology for attribution. *See* 39 U.S.C. § 3652(e)(2).

In the course of its analysis of Proposal Two, however, the Commission recognizes that UPS raises reasonable concerns regarding the existing costing methodologies employed by the Postal Service. The Commission directs the Postal Service to include more specific and detailed information in its cost reporting.

While the Commission does not adopt Proposals One or Two, it recognizes the significant contribution UPS makes with its analysis and discussion of costing methodologies. The Commission encourages continued proposals to improve current costing methodologies, and expects this Order to provide additional transparency as to the Commission's review of those proposals.

Proposal Three requests the Commission review the appropriate share of institutional costs that all competitive products collectively cover. *See* 39 U.S.C. § 3633(a)(3). The Commission is required every 5 years to review the appropriate share referenced in section 3633(a)(3) and determine whether it should be retained, modified, or eliminated. *See* 39 U.S.C. § 3633(b). The Commission declines to consider Proposal Three but plans to conduct this review as required by section 3633(b).

II. PROCEDURAL HISTORY

On October 29, 2015, the Commission issued an order establishing the instant docket to consider Proposals One and Two, appointing a Public Representative, providing interested persons with an opportunity to comment, and holding consideration of Proposal Three in abeyance until the Commission completes its review of Proposals One and Two.[5]

A. Summary of Filings

Between November 20, 2015, and February 24, 2016, seven Chairman's Information Requests (CHIRs) were issued. Appendix C provides a list of CHIRs and responses to CHIRs filed in this proceeding.

The Postal Service, the Public Representative, Amazon Fulfillment Services, Inc. (Amazon), the American Catalog Mailers Association (ACMA), the National Postal Policy Council (NPPC), the Parcel Shippers Association (PSA), Valpak Direct Marketing

[5] Notice of Proposed Rulemaking on United Parcel Service, Inc.'s Proposed Changes to Postal Service Costing Methodologies (UPS Proposals One, Two, and Three), October 29, 2015 (Order No. 2793). Prior to the Commission's notice (and establishment of the docket), the Greeting Card Association (GCA) filed a response to UPS's Petition. Response of the Greeting Card Association to Petition of United Parcel Service, October 15, 2015 (GCA Response). GCA did not object to consideration of the proposals but identified the substantial impact Proposals One and Two could have on market dominant cost attribution. GCA Response at 1.

Systems, Inc. and Valpak Dealers' Association, Inc. (Valpak), and a collective group of market dominant mailers filed initial comments.[6] In addition, representatives[7] for the Postal Service and Amazon filed initial comments. Appendix D contains the full list of comments and reply comments filed in this proceeding.

The National Newspaper Association (NNA), National Association of Letter Carriers (NALC), GCA, the Postal Service, the Public Representative, Valpak, Amazon, Panzar, and UPS filed reply comments.

Several motions were filed by the Postal Service, Amazon, and UPS between October 9, 2015, and March 29, 2016, relating to requests for issuance of CHIRs and access to non-public materials. Appendix E provides a list of motions, Commission orders on motions, and Presiding Officer's Rulings filed in this proceeding.

B. Organization of Discussion

Chapter III of this Order provides an overview and historical record of postal cost attribution and the cross-subsidization of products. It also includes a description of the current methodologies used in postal cost attribution, as well as the present use of the incremental cost test for identifying cross-subsidization.[8]

[6] The collective group of market dominant mailers includes the American Catalog Mailers Association, Inc., Alliance of Nonprofit Mailers, Continuity Shippers Association, Envelope Manufacturers Association, National Association of Presort Mailers, Parcel Shippers Association, PSI Systems, Inc., Stamps.com, and GCA (collectively "Market Dominant Mailers"). Parties that make up the Market Dominant Mailers are mailers or mailers with customers who heavily rely on market dominant mail, are an association of such mailers, or are software or service providers for such mailers. Market Dominant Mailers Comments at 1.

[7] The Postal Service representative was Michael D. Bradley (Bradley), and the Amazon representatives were Sander Glick (Glick), John C. Panzar (Panzar), and T. Scott Thompson (Thompson).

[8] Appendix A provides a primer on costing theory that may be useful to the reader prior to review of technical analysis of costing methodologies that appear in chapters IV and V.

Chapters IV and V discuss Proposals One and Two, respectively. Each chapter provides a description of the proposal and, by issue, a summary of comments received and the Commission's analysis. Chapter VI provides a discussion on competitive market dynamics and includes both a summary of comments received that relate to the competitive market and the Commission's analysis. Chapter VII discusses next steps for Proposal Three. Chapter VIII summarizes the Commission's findings on Proposals One and Two.

III. BACKGROUND

A. Cost Attribution

1. Attributable Costing in a Single-Product vs. a Multi-Product Firm

Costing in a multi-product firm differs substantially from costing in a single-product firm because tracing the source of costs is more difficult in a multi-product firm.

A single-product firm incurs two kinds of costs: variable costs and fixed costs. Variable costs vary with the amount of goods produced, such as direct labor and material inputs, and fixed costs, such as the salary for a company's chief executive officer, do not.[9] The sum of these costs equals total costs. By dividing the total costs by the number of goods produced, a firm can determine the average total cost. Marginal cost is the cost of producing one additional good at a given level of volume. *Industrial Organization: A Strategic Approach,* at 51. Marginal cost is the primary concept used in analysis of profitability and output decisions.

The relationship between volume and total costs can be modeled by a total cost function. Marginal cost can be estimated by calculating the derivative (rate of change)

[9] Jeffrey R. Church & Roger Ware, *Industrial Organization: A Strategic Approach* 53 (2000) (available at: *https://works.bepress.com/jeffrey_church/23/*).

of the total cost function. The percentage change in cost with respect to the percentage change in volume is known as cost elasticity, or variability.[10] A cost function that assumes that the cost elasticity is the same at every level of volume is known as a constant elasticity cost function.[11] When volume increases result in more efficient production of a product (*i.e.,* at a lower unit cost), it is known as economies of scale. *Industrial Organization: A Strategic Approach,* at 54. As the marginal cost of a constant elasticity cost function slopes downward (decreases with each additional unit of volume), the function reflects economies of scale in production.

A multi-product firm is both operationally and economically more complex than a single-product firm and, therefore, exhibits some additional, complicating cost behaviors. A multi-product firm may enjoy economies of scope as well as economies of scale. Economies of scope are cost benefits gained from producing two or more products. These economies of scope result in common variable costs—costs that are shared by multiple products but do not directly vary with any of those individual products. A multi-product firm also has common fixed costs, which are the costs incurred by multiple products (usually the fixed costs associated with starting the firm).

The presence of economies of scope and common variable costs make the attribution of costs in a multi-product firm more challenging. Marginal cost, however, permits the attribution of some of these costs. In a multi-product firm, the concept of marginal cost generally remains the same as in a single-product firm. However, in a multi-product firm, with common variable costs, marginal cost also measures the change in those costs that result from an additional unit of production.

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[10] Robert Cohen, *et al.*, *The Role of Scale Economies in the Cost Behavior of Posts,* 2004, at 1 n.1.

[11] Charles McBride, *The Calculation of Postal Inframarginal Costs*, 2014, at 3-5 (McBride Paper).

Common fixed costs present a similar issue for multi-product cost attribution, as they do not directly relate to any product. In a single-product firm, average total cost could be used for attribution, but a multi-product firm needs a different cost concept to determine how to recover its fixed costs.

In a multi-product firm, incremental costs are costs that result from providing a specific product, and can be traced to that specific product. Incremental costs may include the change in common fixed costs that results from providing a product as a whole. The incremental cost of a product can also be interpreted as the sum of the marginal cost of each unit of volume and can therefore be used for marginal analysis of the product, determining profitability based on whether, and by how much, the product's revenue covers incremental costs. The sum of the incremental costs, if combined for all products, however, does not equal the firm's total costs. The firm would need to set prices greater than incremental costs in order to fully recover its total costs.

Many multi-product firms cannot easily or effectively develop cost functions for entire products, given the various shared activities involved in production. Therefore some firms use other methods, such as activity-based costing, which groups costs by activity or component rather than by product. These costs are then distributed to products by the firm's cost accounting system.

The above describes an idealized cost model of a multi-product firm. A real-world multi-product firm does not have the information necessary to define the entire cost function of each activity. The general assumption of a constant elasticity for the cost function is not supported because it has not experienced volume at all levels of the cost function. The reliability of modeled estimates of variability is highest for volume levels close to the observed data upon which the estimates are based. The constant elasticity assumption is unsupported when used for volume levels substantially outside the range of actual experience.

2. Postal Cost Attribution

Section 3633(a)(2) of title 39 requires that the Postal Service's competitive products cover their attributable costs. *See* 39 U.S.C. § 3633(a)(2). Section 3622(c)(2) clarifies that attributable costs are costs which are established through "reliably identified causal relationships." *See id.* § 3622(c)(2). The history of postal costing demonstrates that lawful cost attribution requires a causal link between the cost component and the product in question.

All Postal Service costs are classified as either attributable or institutional costs. Attributable costs are costs that are assigned to products on the basis of reliably identified causal relationships. Most attributable costs are volume-variable costs, but some fixed costs that are uniquely associated with an individual product are also attributable. These are referred to as product-specific costs.[12]

The Postal Service uses the following process for determining the unit volume-variable costs of products:[13]

1. Divide accrued costs among cost segments and components;
2. Identify a cost driver that reflects the essential activity of each cost element and calculate volume-variable costs;
3. Distribute the volume-variable costs to products;[14] and

[12] Summary Description of USPS Development of Costs by Segment and Components, Fiscal Year 2015, July 6, 2016, file "SUMDES15.zip" (FY 2015 Summary Description of Costs), file "APPH-15.docx," at H-1 (Appendix H). Advertising for a specific product is an example of such a product-specific cost.

[13] Unit volume-variable cost has been proven to be equivalent to the marginal cost for a given product and can therefore be used for marginal analysis and pricing. Panzar Comments, Exhibit 2 at 14-15.

[14] The Postal Service uses one of three methods to determine the relationship between the cost driver and cost and distribute volume-variable costs to products: the volume variability/distribution key method, the constructed marginal cost method, or the piggyback method. FY 2015 Summary Description of Costs, Appendix H at H-4. Each of these is described in more detail in chapter V.

4. Calculate each product's unit volume-variable costs by dividing the total volume-variable cost of the product by its volume.

Id. at H-3-H-4.

After volume-variable costs and product-specific costs have been attributed to products, the residual costs are classified as institutional costs, which generally have two elements: common fixed costs and inframarginal costs.[15] Common fixed costs are costs that do not vary with volume and are not causally related to any specific product.[16] Inframarginal costs are variable costs that are not volume-variable costs. Panzar Comments, Exhibit 2 at 11. In a marginal cost function, these are the costs remaining after volume-variable costs have been calculated.

Incremental costs. A product is cross-subsidized when its revenue does not cover its costs. The costs that are not covered by the product are, therefore, subsidized by a firm's other products. Section 3633(a)(1) of title 39 requires that market dominant products not cross-subsidize competitive products, and the Commission has implemented an incremental cost test in order to test for such cross-subsidization. *See* 39 U.S.C. § 3633 (a)(1). This test estimates the incremental cost for competitive products as a whole to ensure there is no subsidy from market dominant products. The current methodology for this test was approved in Order No. 399 and is discussed in more detail in the Commission's analysis in section IV.C below.[17]

[15] Because institutional costs are calculated as a residual, the composition between common fixed and inframarginal costs is not known.

[16] The Postmaster General's salary is an example of such a common fixed cost.

[17] *See* Docket No. RM2010-4, Order Accepting Analytical Principles Used in Periodic Reporting (Proposals Twenty-Two through Twenty-Five), January 27, 2010 (Order No. 399).

3. History of Commission Costing Under the PRA

The Commission established a methodology for postal costing in the initial omnibus rate cases following the implementation of the Postal Reorganization Act (PRA).[18] The Commission established a two-tier doctrine for costing, which required: (1) the attribution of costs to individual mail classes and services based on reliable proof of causation and (2) that institutional costs be assigned on the basis of "market demand factors and relative price sensitivities."[19] The Commission further stated in Docket No. R80-1 that it was "on record as favoring the use of marginal-cost pricing principles in postal ratemaking."[20]

The Commission's original two-tier approach to ratemaking was ultimately upheld by the Supreme Court, which found that it was consistent with the language and legislative history of the PRA.[21] With respect to the first tier (cost attribution), the Court found that the Commission acted consistently with the statutory mandate and Congress's policy objectives in refusing to use distribution keys or other accounting principles lacking an established causal basis. *NAGCP,* 462 U.S. at 826-829.

In the second step of the Commission's two-tier costing method (the assignment of institutional costs), the Court held that the Commission could rely on the multiple non-cost factors set forth in former 39 U.S.C. § 3622(b)(3).[22] Although the percentage of costs considered to be attributable has varied over time, the Commission's use of the

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[18] *See generally* Docket No. R71-1, Docket No. R74-1, Docket No. R80-1, and Docket No. R84-1; *see also* Postal Reorganization Act (PRA), Pub. L. 91-375, 84 Stat. 719 (1970).

[19] *See* Docket No. R80-1, Appendices to Opinion and Recommended Decision, Volume 2 of 2, February 19, 1981, Appendix B. *See also* Towards Postal Excellence, The Report of The President's Commission on Postal Organization, June 1968 (Kappel Commission Report).

[20] *See* Docket No. R80-1, Opinion and Recommended Decision, Volume 1 of 2, February 19, 1981, ¶ 0344 (Docket No. R80-1 Opinion Vol. 1).

[21] *See National Association of Greeting Card Publishers v. United States Postal Service*, 462 U.S. 810 (1983) (*NAGCP*).

[22] *See* PRA section 3622(b)(3); *see also NAGCP,* 462 U.S. at 825.

PRA's non-cost factors remained the primary method of allocating institutional costs from the resolution of Docket No. R71-1 until the passage of the Postal Accountability and Enhancement Act (PAEA).[23]

4. History of Commission Policy Regarding Incremental Costing

Under the PRA, attributable cost served as a floor over which the Commission set a "marked up" price to generate a reasonable contribution to all other costs. In Docket No. R97-1, the Commission accepted the incremental cost test, wherein the revenues collected from any service (or group of services) must be at least as large as the additional (or incremental) cost of adding that service (or group of services) to the enterprise's other offerings.[24] In that proceeding, however, the Commission found that a reliable measure of incremental costs was not developed on the record. *See* Docket No. R97-1 Opinion Vol. 1 ¶ 4026.

In Docket No. R2000-1, the Postal Service presented a new method for calculating incremental costs in lieu of attributable costs.[25] The Commission noted that "[t]he task of developing reliable incremental costs for the Postal Service, a multi-product regulated entity with public service obligations, is daunting."[26] The Commission declined to employ the new method, citing its observation in Docket No. R97-1 that its

[23] *See generally* Docket No. R71-1, Chief Examiner's Initial Decision on Postal Rate and Fee Increases, February 3, 1972. *See also* Postal Accountability and Enhancement Act (PAEA), Pub. L. 109-435, 120 Stat. 3198 (2006).

[24] *See* Docket No. R97-1, Opinion and Recommended Decision, Volume 1, May 11, 1998, at 230 (Docket No. R97-1 Opinion Vol. 1); *see also* Docket No. R97-1, Direct Testimony of John C. Panzar on Behalf of United States Postal Service, July 10, 1997, at 8.

[25] *See* Docket No. R2000-1, Direct Testimony of Michael D. Bradley on Behalf of United States Postal Service, January 12, 2000, at iv (USPS-T-22).

[26] Docket No. R2000-1, Opinion and Recommended Decision, Volume 1, November 13, 2000, at 198.

calculation of attributable costs by subclass was "a reasonable proxy for the incremental costs associated with that subclass or type of mail." *Id.*

The PAEA, in section 3633(a)(1), directed the Commission to adopt regulations to "prohibit the subsidization of competitive products by market dominant products."[27] In Docket No. RM2007-1, the Commission adopted general rules to enforce the prohibition against cross-subsidy of competitive products.[28] In Order No. 43, the Commission adopted 39 C.F.R. § 3015.7(a), which requires that incremental costs be used to test for cross-subsidy of competitive products.[29] In Docket No. RM2008-5, with respect to the use of incremental costs as a test for cross-subsidy, the Commission stated that 39 U.S.C. § 3633(a)(1) required only that "incremental costs apply to competitive products as a group, not to individual products."[30]

In Docket No. RM2010-4, the Commission approved a hybrid methodology proposed by the Postal Service for calculating the incremental cost of competitive products. Docket No. RM2010-4, Order No. 399 at 3-5, 14. The proposed methodology calculated the incremental cost for each cost component used by any individual competitive product or combination of products as the sum of the common fixed costs, the product-specific fixed costs, and the costs caused by provision of the relevant cost driver. This method essentially "identif[ies] the decrement in total cost of the component that would occur if the product or group of products were not to be provided."[31] The

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[27] PAEA section 3633(a)(1); *see* 39 U.S.C. § 3633(a)(1).

[28] Docket No. RM2007-1, Order Establishing Ratemaking Regulations for Market Dominant and Competitive Products (With Table of Contents), October 29, 2007 (Order No. 43)

[29] *See* Docket No. RM2007-1, Order No. 43 at 109, 138; *see also* 39 C.F.R. § 3015.7(a).

[30] Docket No. RM2008-5, Order No. 106, Order Proposing Accounting Practices and Tax Rules for Competitive Products, September 11, 2008, at 14.

[31] Docket No. RM2010-4, Petition of the United States Postal Service Requesting Initiation of a Proceeding to Consider Proposed Changes in Analytic Principles (Proposals Twenty-two – Twenty-five), October 23, 2009, Proposal Twenty-Two at 2-3 (Docket No. RM2010-4 Proposal Twenty-Two).

Postal Service also asserted that the approach would cause incremental costs to exceed the corresponding attributable costs and thus result in a better cost floor for cross-subsidy testing. Docket No. RM2010-4 Proposal Twenty-Two at 5. The Commission approved the proposal, stating that the approach would raise the competitive product cost floor, bringing it "closer to actual incremental costs" and "ensur[ing] [] there is an economically efficient incentive for entry by competitors who might otherwise be unable to participate in postal markets." Docket No. RM2010-4, Order No. 399 at 4.

B. Legal Standard

Two legal standards are relevant to the Commission's review of the proposals. Both proposals relate to the potential attribution of costs; therefore, each must meet the statutory requirements for such costs to be attributable. Second, both proposals represent a potential change to an accepted analytical principle; therefore each must meet the statutory requirements concerning such changes.

1. Reliably Identified Causal Relationships

Section 3622(c)(2) requires that costs must be attributed through "reliably identified causal relationships." 39 U.S.C. § 3622(c)(2). The Commission interprets this requirement to be two-fold, that the relationship between costs and products must be causal in nature and reliably identified. If a relationship is causal but not reliably identified, accurate and economically efficient attribution is not possible as it is unclear precisely how to attribute these costs to products. If a relationship is reliably identified but not causal, the attribution of those costs is neither accurate nor leads to economically efficient prices.

2. Improve the Quality, Accuracy, or Completeness

Section 3652(e)(2) allows the Commission to conduct a proceeding to "improve the quality, accuracy, or completeness of Postal Service data required by the Commission…" when it appears "the attribution of costs or revenues to products has become significantly inaccurate or can be significantly improved…" or "such revisions are, in the judgment of the Commission, otherwise necessitated by the public interest." 39 U.S.C. § 3652(e).

The standard under section 3652(e)(2), for proposals affecting attribution such as Proposals One and Proposal Two, can be synthesized into a requirement that such a proposal remedy a significant inaccuracy or significantly improve the quality, accuracy, or completeness of Postal Service data or the attribution of costs to products, or be, in the judgement of the Commission, necessitated by the public interest.

IV. PROPOSAL ONE

A. Overview

In Proposal One, UPS seeks to attribute the inframarginal costs of cost components to products, which, combined with currently-attributed volume-variable costs, would result in the attribution of all variable costs to products. UPS divides Proposal One into two parts: (1) the establishment of causal relationship between inframarginal costs and products and (2) the calculation and allocation of inframarginal costs.

UPS states "the Postal Service should start doing what it suggests it is already doing: it should distribute *all* costs that vary with volume (including inframarginal costs) to products (including competitive products)." Petition, Proposal One at 19 (emphasis in original). UPS asserts that, by attributing only marginal costs, the Postal Service is assuming that the marginal cost is constant across all levels of volume. *Id.* at 4. To put

it another way, UPS argues that by attributing only marginal costs, the Postal Service is ignoring the existence of economies of scale and scope. *Id.* at 4-5.

UPS maintains that inframarginal costs are causally related to products. UPS points out that causal relationships are the basis for cost attribution, and that a finding of variability is effectively a finding of causation. *Id.* at 13-14. UPS argues that the Postal Service fails to attribute inframarginal costs when it "set[s] prices for competitive products that do not take into account the full set of variable costs caused by those products." *Id.* at 15. UPS states that this method of attribution means that the Postal Service's "[c]ompetitive products are only required to bear the lowest variable costs — marginal costs" and "captive [market dominant] mail customers are left to pay for the more expensive variable [inframarginal] costs." *Id.* UPS contends that this approach allows the Postal Service to utilize less efficient pricing than private competitors. *Id.* In support of its proposal to attribute inframarginal costs, UPS argues that the Commission has previously "emphatically rejected the exclusive use of marginal cost as a cost floor" when the Commission stated it "[could not] agree that marginal cost is all that is meant by the term 'attributable.'" *Id.* at 16 (citing Docket No. R97-1 Opinion Vol. 1 at 233).

UPS representative Neels uses a model previously developed by Dr. Charles McBride (McBride) to calculate the magnitude of inframarginal costs and argues that approximately 16 percent of the Postal Service's total costs are inframarginal.[32]

In addition, UPS proposes using pre-existing distribution keys for cost components to attribute inframarginal costs. Petition, Proposal One at 19-21. UPS cites a report by Neels to explain the relationship between inframarginal costs and

[32] Neels Reply Comments at 22-23. In its initial proposal, UPS claims that 20 percent of the Postal Service's total costs are inframarginal. Petition, Proposal One at 9. In response to revised information provided by the Postal Service in its initial comments, that percentage was revised to 16 percent. *See* Neels Reply Comments at 22. McBride assumes a constant elasticity function for the Postal Service's cost components to estimate component-level inframarginal costs; however, he does not attribute these costs to products. *See* McBride Paper at 5.

distribution keys, stating "the total amount of inframarginal cost in a component is directly related to the total amount of the cost driver(s) of a component, and the total amount of cost driver is in turn a function of the quantities of the products whose provision relies on that cost category." *Id.* at 20 (quoting Neels Report at 18). UPS concludes that the Postal Service's distribution of only marginal costs through distribution keys is "arbitrary and capricious." *Id.* at 20-21.

1. Effect on Cost Attribution

Adoption of Proposal One would result in attributing inframarginal costs, which have historically been treated as institutional costs. Proposal One would affect the attribution of all individual postal products because inframarginal costs exist across all postal products. Proposal One also expands the use of distribution keys beyond marginal costs to include inframarginal costs and would require a finding that a causal relationship exists between component inframarginal costs and postal products. Adoption of Proposal One would also require a finding that the pre-existing distribution keys reflect such a reliably identified causal relationship between inframarginal costs and products. If the Commission finds a reliably identified causal relationship (including an allocation method) for inframarginal costs, the Commission must also find that Proposal One satisfies the requirements of section 3652(e), *i.e.*, remedies a significant inaccuracy or significantly improves the quality, accuracy, or completeness of Postal Service data or the attribution of costs or revenues to products, or, in the judgment of the Commission, is otherwise necessitated by the public interest before those costs must be attributed pursuant to 39 U.S.C. §§ 3633 and 3622(b).

2. Effect on Cross-Subsidization

Section 3633(a)(1) of title 39 prohibits the cross-subsidization of competitive products by market dominant products. That is, competitive products must recover their costs through their own revenues. To detect whether cross-subsidization occurs, the

Commission utilizes an incremental cost test to determine whether competitive products as a whole are fully recovering their costs. The details of this test are discussed in chapter III above.

UPS contends that the incremental cost test fails to determine whether the Postal Service's competitive products are in fact recovering all of their costs. UPS cites Neels in explaining that the incremental cost test uses an "'ordered methodology' that assigns to market dominant products the most expensive variable costs of the enterprise." *Id.* at 21-22 (citing Neels Report at 22). It argues that this methodology "assumes [] market dominant products come first on the curve and [] competitive products come last." *Id.* at 22. UPS asserts that "customers of the Postal Service's market dominant products are funding the infrastructure that creates economies of scale, and [] competitive products are riding for free (or nearly free) by covering only the tail-end of the marginal cost curve." *Id.* at 22-23. UPS argues that a proper test for cross-subsidization would be to remove any ordering assumptions about which products benefit from economies of scale and scope. *See id.* at 23.

UPS proposes such an order-neutral test for cross-subsidization through the use of the Shapley value.[33] UPS, through Neels, develops a construction of the Shapley value that "consider[s] all possible orderings of the products and then take[s] the average cost assignment across all orderings." Petition, Proposal One at 24 (citing Neels Report at 23). This construction is identical to the use of distribution keys to attribute inframarginal costs and would provide an additional test for cross-subsidization. *See generally id.* Proposal One. UPS contends that adoption of Proposal One will "ensure that competitive products as a group are bearing a

[33] The Shapley value is a concept developed in game theory to determine the rewards people receive in a cooperative game based on their contribution and the possible orderings in which they contributed. *See* Avinash Dixit & Susan Skeath, *Games of Strategy* 572 (1999).

proportional share of all variable costs, and are not assigned only the cheapest units of variable costs." *Id.* at 25.

3. Effect on Postal Markets

As stated above, adoption of Proposal One would affect the costs of all individual postal products because inframarginal costs exist across all postal products, resulting in widespread impacts on product cost coverage. Should a competitive product's cost coverage fall below 100 percent as a result of the implementation of Proposal One, the Postal Service would be required to either discontinue the product or increase its revenues pursuant to 39 U.S.C. § 3633. *See* 39 U.S.C. § 3633.

B. Summary of Initial and Reply Comments

1. Cost Attribution

a. Defining Inframarginal Costs

The commenters, with the exception of the Public Representative and ACMA, agree on the definition and scope of inframarginal costs.[34] The Public Representative contends that issues with inframarginal costs arise due to misleading terminology in Postal Service costing. The Public Representative states that the formula used to develop volume-variable costs does not include all costs that vary with volume as the term volume-variable costs would imply. PR Reply Comments at 5-6. Instead, the Public Representative defines the formula used to develop volume-variable costs as the "unit or marginal change in component costs evaluated at total volume or total cost drivers." *Id.* at 6 (emphasis omitted). The Public Representative defines inframarginal

[34] The generally agreed upon definition of inframarginal costs is all variable costs less volume-variable costs. The Public Representative, while disputing the terminology surrounding inframarginal and volume-variable costs, agrees with the formulae that define each of them.

costs as "the portion of component costs which vary with each unit change in the component cost driver evaluated at each unit of the cost driver other than the unit change evaluated at total volume." *Id.* According to the Public Representative, inframarginal costs are the costs of the component that vary with volume if the marginal cost at every level of volume is not equal to the marginal cost of the last unit. *Id.* at 5-6.

ACMA defines inframarginal costs as "the difference in cost between two volume levels, minus a corresponding volume-variable cost" when calculated according to a long-run total cost function. ACMA Comments at 26.

b. Calculating Inframarginal Costs

Many commenters criticize UPS's calculation of inframarginal costs. The Public Representative expresses support for it.

Both Amazon and the Postal Service argue that Proposal One violates the statutory requirement that inframarginal costs must be reliably identified. Amazon Comments at 85-89; Postal Service Comments at 1, 13-27. Amazon criticizes certain UPS assumptions about the classifications of Postal Service cost components, particularly the assumption that they exhibit constant elasticity. Amazon Comments at 86. UPS assumes constant elasticity at all levels of volume, but both the Postal Service and Amazon argue that this assumption is not empirically verifiable because the Postal Service has never had volume so low or as significantly far away from current levels as the assumption requires. Amazon Comments at 86; Postal Service Comments at 16-17. Amazon states that as a result, determining the amount of fixed costs requires extrapolating the cost curve beyond the existing ranges of volume, which leads to the assumption about the shape of the curve at levels of volume the Postal Service has not experienced. Amazon Comments at 87. Amazon contends that such an assumption about the shape of the curve can radically change the amount of fixed costs and, by

extension, inframarginal costs. *Id.* at 87-88. As a result, Amazon concludes that no reliable method exists for calculating inframarginal or fixed costs. *Id.* at 85.

ACMA argues that "[i]nframarginal costs are not categories of costs whose behavior can be examined."[35] ACMA underlines that Neels's inframarginal costs "are developed for components, not products." *Id.* at 30 (emphasis omitted). ACMA, therefore, concludes that the "simplest" reason why inframarginal costs should not be attributed is that they were not found "pursuant to any notion of the cost of a product." *Id.*

Contrary to other commenters, the Public Representative endorses the general methodology (developed by McBride and used by Neels) that UPS applies to calculate inframarginal costs, which he states is based on the Commission-accepted methodology for calculating and distributing inframarginal costs to competitive products.[36]

The Public Representative also asserts that concerns about using constant elasticity to estimate costs over the range of volume are easily dismissed.[37] In response to commenters' concerns about inaccurate calculations, the Public

[35] ACMA Comments at 28. ACMA states that inframarginal costs are instead the differences between the accrued costs over the maximum volume range with the volume-variable costs subtracted out, estimated by assuming a long-run cost curve. *Id.* at 28-29.

[36] PR Comments at 25. Amazon states that the Public Representative's claim that Neels used the Commission's current methodology for calculating and distributing inframarginal costs to competitive products is "flatly untrue." Amazon Reply Comments at 23. Amazon asserts that "[t]here is no accepted methodology for estimating component inframarginal costs" and that Neels adopted a set of "untestable" assumptions used by McBride, who "himself expressed doubts about the reliability" of his approach. Amazon Reply Comments at 23-24.

[37] PR Reply Comments at 12-13. In its reply comments, the Postal Service responds to the assumptions the Pubic Representative relies on in his costing calculations. The Postal Service notes that the Public Representative assumes that: (1) variability (cost elasticity) of each cost component is constant; (2) each component's marginal cost is constant at all levels of production; and (3) when marginal costs are allocated to products, economies of scale and scope are also allocated to products, each of which is incorrect. Postal Service Reply Comments at 9-14; *see also id.* Appendix A at 1-7.

Representative maintains that the constant elasticity assumption is reasonably close to more complex incremental cost calculations done without a constant elasticity assumption. PR Reply Comments at 15. This closeness, he asserts, justifies retaining the constant elasticity assumption for calculating product incremental costs as the sum of product volume-variable and inframarginal costs. *Id.* The Public Representative also cites past Commission's decisions to accept a method of estimating city carrier load time variability evaluated at mean volume in Docket Nos. R87-1 and R90-1 as evidence that the Commission has effectively accepted the use of the constant elasticity assumption for all volume levels. *Id.* at 15-17.

Neels also defends the usage of the constant elasticity assumption. He states that "[i]f the entire component is judged to be variable, even if marginal cost declines with increases in output, the entire body of costs will be attributed to products, eliminating any concerns about potential errors in 'extrapolating to the origin.'" Neels Reply Comments at 13.

c. Allocating Inframarginal Costs

(1) Shapley Values

Commenters note various issues with UPS's use of Shapley values.[38] Some commenters argue technical issues, while others contend that Shapley values are inconsistent with title 39 requirements. The Public Representative is the only commenter to support UPS's approach.

Amazon argues that the virtue of Shapley values as described by Neels (the allocation of variable costs in an "order–neutral" fashion rather than by treating each

[38] The Postal Service contends that in its response to CHIR No. 4, UPS "backed off" from its claim that Proposal One uses Shapley values to allocate inframarginal costs and instead stated that its proposal is "consistent" with Shapley values. Postal Service Comments at 16 (citing UPS Response to CHIR No. 4, question 2).

increment as being produced last) is in fact its "fatal defect."[39] This is because, as Panzar points out, the Shapley method would result in allocating the inframarginal costs of each component in the same proportions as volume-variable costs, and these allocations would have no relationship to marginal, attributable, or incremental costs. Panzar Comments at 17. Panzar concludes that the use of Shapley-allocated costs to set prices would be "economically unsound." *Id.* Bradley dismisses Shapley values as "just one of an infinite number of possible allocations of common costs" that "do not depend upon or provide a causal link between products and their assigned costs." Bradley Comments at 24. He also states that a true calculation of Shapley values for an enterprise the magnitude of the Postal Service would be computationally infeasible. *Id.* at 27. NALC also argues that Shapley values are inappropriate for the Postal Service and maintains that Proposal One's use of Shapley values is tantamount to being "based on arcane game theory," which "has little connection to the reality of the cost of mail delivery." NALC Reply Comments at 2.

The Postal Service, Bradley, and Amazon criticize Neels's attempts to justify the use of Shapley values by providing examples of other regulatory bodies that also use Shapley values. Postal Service Comments at 9-13; Bradley Comments at 27-28; Amazon Comments at 17; *see* Neels Report at 23. The Postal Service argues that UPS "grasps at straws in its attempt to find another example of a regulatory body" that uses Shapley values to allocate costs and disputes each example cited by UPS.[40] Similarly, Amazon criticizes UPS's claims that the Commission should adopt Proposal One

[39] Amazon Comments at 90. This characterization is also shared by the Market Dominant Mailers. *See* Market Dominant Mailers Comments at 10.

[40] Postal Service Comments at 9-13; *see also* UPS Response to CHIR No. 4, question 3. The Postal Service observes that in two of the examples provided by UPS, the regulator either discussed or considered the use of Shapley values as a cost allocation method but rejected it. Postal Service Comments at 9-10. In addition, the Postal Service states that UPS's Surface Transportation Board (STB) example is "inapt" because, among other things, STB has never "relied on fully distributed costing (which is, in essence, what UPS's version of 'Shapley values' amounts to)." *Id.* at 11-13.

because other regulatory agencies use the Shapley method to allocate costs and concludes that these claims are "unfounded." Amazon Comments at 17.

In addition to the specific criticisms by the Postal Service, Amazon, and their respective representatives, many commenters assert that the use of Shapley values would be inconsistent with multiple statutory provisions and encourage the Commission to reject Shapley values.[41]

The Public Representative defends the usage of Shapley values for the allocation of inframarginal costs. He suggests that they can be used in tandem with forward looking, long-run incremental costs[42] and argues that economists have published a method to make Shapley values simpler to interpret for cost allocation.[43] He contends that, contrary to critics' claims, such allocation using Shapley values would be non-arbitrary "when considered from a normative view, namely when concepts of equity and fairness are given weight in decision making." PR Reply Comments at 25.

[41] The Market Dominant Mailers state that the use of the Shapley approach (which allocates average variable costs "over the entire range of output" regardless of a causal link) is "flatly inconsistent" with sections 3622, 3631, and 3633. Market Dominant Mailers Comments at 10-12. ACMA argues that allocating inframarginal costs using the Shapley method does not link the costs to products in any "meaningful way." ACMA Comments at 39-40. Amazon states that "prices that result from the Shapley method cannot satisfy 39 U.S.C. §§ 3622(c)(2), 3631(b) or 3633(a)(1) and (2)." Amazon Comments at 90.

[42] Forward looking, long-run incremental costs (also known as "Total Element Long-Run Incremental Cost[s]") are the estimated cost of an entire network, including possible improvements to the network. *See* Mark A. Jamison, *Cost Concepts for Utility Regulators*, 2006, at 16-18 (available at: *http://warrington.ufl.edu/centers/purc/purcdocs/papers/0638_Jamison_Cost_Concepts_for.pdf*).

[43] PR Reply Comments at 24, 26; *see* Alvin E. Roth & Robert E. Verrecchia, *The Shapley Value as Applied to Cost Allocation: A Reinterpretation*, Journal of Accounting Research, 295-303 (1979).

The Public Representative also cites papers by Edward S. Pearsall and Nam-Dũng Hoàng that develop algorithms that, he believes, can quickly compute Shapley values for the orders of magnitude necessary for the Postal Service's use.[44] For these reasons, the Public Representative recommends that the Postal Service use Shapley values developed by a forward looking, long-run incremental cost model, which would determine the costs of building a competitive network and a market dominant network. PR Reply Comments at 26-27.

Neels attempts to rebut the criticism that Proposal One is too computationally complex and does not account for changes in product definition by clarifying that Proposal One uses cost driver units, not products, as the basis for allocation. Neels Reply Comments at 15-16. Neels argues that by using cost driver units, Proposal One "avoids the introduction of an additional complication into the Commission's analysis of any proposed changes in product definition," and "allows for the mathematical simplification [described in the Neels Report] and avoids the computational difficulties usually associated with the Shapley method." *Id.* at 16.

UPS also replies to commenters and defends the usage of Shapley values as confirmation of the rigor of Proposal One. It cites the Neels Report as demonstrating that the Shapley value allocation methodology is equivalent to using distribution keys and cost drivers to allocate inframarginal costs. UPS Reply Comments at 30 (citing Neels Report at 28). UPS clarifies that Shapley values are not being used to identify causal relationships; rather, UPS states that Proposal One uses the pre-existing distribution keys to identify the causal relationships. *Id.* at 31. Thus, UPS argues Shapley values "confirm[] the precision and rigor" of the use of distribution keys to

[44] *Id.* at 26 (citing Edward S. Pearsall, *The Complete Incremental Cost Test for Cross-Subsidies with a Sub-Modular Cost Function,* 36 J. Regul. Econ. 274 (2009); and Nam-Dũng Hoàng, *Algorithmic Cost Allocation Games: Theory and Applications,* in Operations Research Proceedings 2011 (Diethard Klatte *et al.* eds., 2012)).

identify causal relationships. *Id.* Unlike Neels, who advocates for immediate adoption of the Shapley-based allocation of inframarginal costs, UPS notes that Shapley values could be used directly for postal costing in the future. *Id.* at 31 n.36; *see generally* Neels Reply Comments.

(2) Distribution Key Allocation

All commenters but the Public Representative oppose UPS's proposal to use distribution keys to allocate inframarginal costs to products, especially as it relates to the issue of causality.

Amazon and GCA disagree with UPS's position on distribution keys and argue that the use of distribution keys is improper when costs are not caused by a particular class or product.[45] Referencing Panzar, Amazon states that the very existence of the "underlying causal link" between volumes and costs (and not the mere existence of the distribution keys) determines whether the use of distribution keys is legitimate. Amazon Comments at 84; *see also* Panzar Comments at 15-17. Panzar asserts that if the distribution keys currently used to distribute volume-variable costs were also used to distribute all variable costs, it would lead to an overstatement of the costs of individual products. Panzar Comments at 17.

The Market Dominant Mailers express a similar view, arguing that the Postal Service's use of distribution keys to distribute some variable costs "hardly justifies" using distribution keys to distribute all variable costs. Market Dominant Mailers Comments at 12. Also, similar to Amazon, the Market Dominant Mailers contend that "[w]hat justifies the attribution is not the distribution key, but the evidence of an

[45] Amazon Comments at 84; GCA Reply Comments at 1. UPS contends that distribution keys can be used to allocate inframarginal costs because distribution keys are currently used to allocate volume-variable costs. Petition, Proposal One at 19-21.

underlying causal relationship sufficient to justify the attribution, which in turn justifies the use of a distribution key. Proposal One has it backwards."[46]

The Public Representative, however, states that for purposes of distributing variable costs to products, there is no reason to distinguish inframarginal costs from other variable costs. *See* PR Comments at 28-29. The Public Representative, therefore, concludes that distribution keys currently used to allocate volume-variable costs can be also used to allocate inframarginal costs. *Id.* at 29. To support this conclusion, the Public Representative asserts that both volume-variable costs and inframarginal costs contain common costs, and because the Commission has accepted the usage of distribution keys to allocate volume-variable costs to products, inframarginal costs should be treated no differently. PR Reply Comments at 7-8.

The Public Representative advocates using distribution keys when they "reasonably capture cost causation within each component," even though they "may not perfectly capture the share of common volume-variable costs caused by each product." *Id.* at 8. The Public Representative disputes the concerns against the usage of distribution keys to allocate inframarginal costs, arguing that they "assume a mathematical purity which is impossible to implement." *Id.* at 9. He notes that regulated utilities must make reasonable assumptions in order to approximate accurate utility costs. *Id.* at 8. The Public Representative does not believe that "the perfection of theory" should be "the enemy of good attribution" and concludes that distribution keys are acceptable so long as the cost drivers accurately reflect causation for any given component. *Id.* at 9-10.

The Postal Service disagrees with the Public Representative's use of distribution keys and maintains that the rationale for distributing volume-variable costs is "very

[46] *Id.* at 13 (footnotes omitted). ACMA concurs with this position. *See* ACMA Comments at 32.

different" from the rationale used to distribute all inframarginal costs. Postal Service Reply Comments at 25. The Postal Service describes the distribution of volume-variable costs as following "a causal path," which "produces a meaningful cost measurement." *Id.* In contrast, it describes the distribution of inframarginal costs as "arbitrary" and "non-causal," which "produces an undefined and misleading cost measure." *Id.* GCA criticizes the Public Representative's justification of the use of distribution keys to allocate inframarginal costs and argues that "mere variability does not establish the required causal connection" between inframarginal costs and products. GCA Reply Comments at 1-2. GCA further contends that to assign common costs, "one is content to rely on accounting conventions which are not meant to, and cannot, establish causal relationships." *Id.*

On reply, UPS argues that Proposal One uses the existing identifiers of causation (cost drivers and distribution keys as developed by the Postal Service) to allocate inframarginal costs. UPS Reply Comments at 14-16. UPS claims that attributing average variable costs using distribution keys in a multi-product enterprise is analogous to attributing average variable cost in a single-product enterprise, and provides a reliable way to attribute cost drivers among multiple products. *Id.* at 17.

(3) Fully Distributed Allocation

Both the Postal Service and Amazon claim that UPS is essentially proposing a fully distributed costing scheme, which is a form of costing previously dismissed by the Commission.[47] In their reply comments, UPS and Neels reject the accusation that Proposal One amounts to fully distributed costing, explaining that Proposal One does

[47] Postal Service Comments at 5-6; Amazon Comments at 13-14; Amazon Reply Comments at 10-11; *see* Docket No. R84-1, Opinion and Recommended Decision, Volume 1 of 2, September 7, 1984, at 116-119. Additionally, Bradley demonstrates that UPS's method of applying Shapley values is incorrect and is actually a fully distributed cost allocation scheme. Bradley Comments at 31-32, 35.

not seek to allocate the fixed and common costs of the Postal Service to products. UPS Reply Comments at 19-20; Neels Reply Comments at 14.

(4) Incremental Cost Attribution

Some commenters suggest an additional cost attribution method that differs from Proposal One, namely incremental cost attribution.

Valpak recommends that the Postal Service "re-think from the ground up" its pricing of market dominant products by using incremental costs instead of marginal costs as the basis for cost attribution. Valpak Comments at 15. Valpak argues that this change would allow the Postal Service to reassess its pricing strategy. *Id*. Valpak also states that adopting an incremental cost price floor would avoid cross-subsidies within each market dominant mail class and would increase transparency. *Id.* at 17-18. Valpak recommends that the Commission adopt measures of incremental cost, distinct from the current calculation of attributable cost, and that the Commission should require that products cover their incremental costs. Valpak Reply Comments at 25-26.

Panzar also suggests that using incremental costs for attribution is correct but that the current measure of attributable costs is a "reasonable proxy." Panzar Comments at 15.

The Public Representative encourages the Commission to "adopt new measures of incremental cost which fairly share the burden of common marginal, common inframarginal, and common institutional costs." PR Reply Comments at 20.

d. Cost Causality

Many commenters also discuss whether Proposal One satisfies the statutory requirement that a reliably identified causal relationship exist between a cost and a product. UPS maintains that inframarginal costs are causally related to products and seeks to justify their inclusion in attributable costs by asserting that distribution keys

identify causal links between inframarginal costs and products. Petition, Proposal One at 19-21. The Public Representative supports UPS's position that a causal relationship between inframarginal costs and products exists. However, the majority of commenters take issue with UPS's and the Public Representative's assertions concerning the alleged causal relationship.

The Public Representative supports many of the arguments made by UPS concerning the existence of a causal link between inframarginal costs and products. He expresses agreement with UPS's contention that if volume-variable costs should be considered causally related to products, then inframarginal costs must also be causally related to products. PR Comments at 25-27. As for UPS's assertions concerning the use of distribution keys, the Public Representative agrees that the Commission's acceptance of the Postal Service's use of distribution keys to allocate component costs implies the Commission's acceptance of a causal link between the volume-variable costs that are jointly caused by all products and the individual products themselves. *Id.* at 26.

The Public Representative asserts that the Postal Service's use of inframarginal costs in the calculation of incremental costs is evidence that the Postal Service has implicitly accepted that causation exists between inframarginal costs and products.[48] He argues that because inframarginal costs are calculated for each competitive product in the development of incremental costs, they meet the criteria for being considered attributable costs. PR Reply Comments at 11.

Finally, while UPS does not discuss attributing inframarginal costs beyond competitive products, the Public Representative asserts that a causal relationship exists between market dominant products and inframarginal costs and therefore argues that

[48] PR Reply Comments at 10-11; *see* Postal Service Response to CHIR No. 6, question 1.

those costs should be attributed to market dominant products, as well. PR Comments at 3, 25.

The Postal Service, however, maintains that Proposal One runs counter to the long-standing principle that costs may only be assigned to individual products on the basis of reliable causal relationships and that the current costing methodology "already capture[s] all costs that can be reliably [and] causally linked to products."[49] The Postal Service notes that the Public Representative's argument that the causal relationship for volume-variable costs also applies to inframarginal costs does not recognize the "fundamental difference between the two types of costs"—that is volume-variable costs are caused by individual products and inframarginal costs are not. Postal Service Reply Comments at 19.

Amazon's position is that Proposal One would be "unlawful" because it requires the attribution of certain (inframarginal) costs to individual mail products without evidence of causation.[50] Amazon maintains that the Public Representative is "mistaken" when he asserts a reliable causal link exists between inframarginal costs and competitive products because some costs are jointly incurred by multiple products. Amazon Reply Comments at 22. Amazon and Panzar define appropriate cost causation as only those costs that are brought into existence by adding a specific product or are avoided if that specific product were discontinued. Amazon Comments at 81; *see* Panzar Comments at 4-5, 12-13. Panzar states that UPS lumping together all variable costs requires that the unit price for each product cover the resulting

[49] Postal Service Comments at 5, 18. Amazon agrees with the Postal Service, stating that cost measures currently in place include all reliably identified causally related costs. Amazon Reply Comments at 7.

[50] Amazon Comments at 39. Amazon's position remains unchanged in its reply comments. *See* Amazon Reply Comments at 4. The Market Dominant Mailers make a similar argument as the Postal Service and contend that Proposal One would "violate one of the most basic requirements of postal costing and ratemaking: the requirement of causation." Market Dominant Mailers Comments at 3.

average cost—an "extraordinary result" that is unsupported by the arguments advanced in Proposal One. Panzar Comments at 11.

Panzar contends that "[variable] costs are jointly caused by all the services that utilize [a] component's cost driver," thus the causal relationship is joint, not individual, which is a "crucial" distinction for a multi-product enterprise like the Postal Service. *Id.* at 11, 12 (emphasis omitted).

UPS seeks to counter the contentions concerning causality by arguing that causality does not have to be exclusive to individual products to be attributable under the statute.[51] UPS contends that Amazon and the Postal Service mistakenly assume cost causation is limited to marginal or incremental costs, because the statute also requires the attribution of indirect costs. UPS Reply Comments at 18. UPS argues that Congress sought to ensure a level playing field with private sector companies by requiring the Postal Service to cover attributable direct and indirect costs, yet the Postal Service has failed to attribute any indirect costs.[52] UPS believes the Kappel Commission Report, the PRA, and the PAEA support its conclusion that indirect postal costs can be attributed to products "despite not being directly, exclusively, or unequivocally caused by a single product."[53] Thus, UPS maintains, based on its perceived definition of indirect costs, inframarginal costs can be reliably identified with a particular class of products, even if those products are not "the *sole* or *exclusive* cause" of the cost. UPS Reply Comments at 13 (emphasis in original).

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[51] UPS Reply Comments at 13; *see* 39 U.S.C. § 3631(b).

[52] *Id.* at 9-10 (citing S. Rep. No. 108-318, at 14 (2004) and H.R. Rep. No. 109-66, pt. 1, at 44 (2005)); *see* 39 U.S.C. § 3633(a)(2) and 39 U.S.C. § 3631(b).

[53] UPS Reply Comments at 12; *see generally* Kappel Commission Report; PRA; and PAEA. The Kappel Commission, based on recommendations by its rate consultant, Foster Associates, Inc., defined indirect costs as "those elements of cost which cannot unequivocally be associated with a particular output or product." *See NAGCP,* 462 U.S. at 827 n.21.

2. Testing for Cross-Subsidy

Incremental cost test. In Proposal One, UPS contends that the incremental cost test fails to determine whether the Postal Service's competitive products are in fact recovering all of their costs. Petition, Proposal One at 21-25. In the Neels Report, Neels argues that the test assigns to market dominant products the most expensive variable costs of the enterprise. Neels Report at 21-22. UPS proposes an order-neutral test for cross-subsidization through the use of the Shapley value. However, many commenters argue against altering the incremental cost test.

Panzar supports the test's continued use and argues that the incremental cost price floor prevents an unfair advantage because prices that satisfy the incremental cost test ensure that neither the customers of the Postal Service's market dominant products nor the Postal Service itself are made worse by the fact that competitive products are offered. Panzar Comments at 13-14.

NPPC states that "Proposal One raises important issues pertaining [to] incremental costs and cross-subsidization," but it maintains "incremental costs are the correct test for cross-subsidy." NPPC Comments at 4, 6. However, NPPC also notes that because some inframarginal costs are a part of a product's incremental costs, they should be included when testing for cross-subsidy.[54] As an alternative, NPPC urges the Commission to apply the incremental cost test to market dominant products if Proposals One and Two are approved. NPPC Comments at 8-9.

Valpak explains that cross-subsidies arise when the price of a product does not cover all of the costs caused by that product. Valpak Reply Comments at 12-13 (quoting Postal Service Comments at 22). As a result, customers of that product pay

[54] *Id.* at 3, 6-7. In response to NPPC's comments, Amazon states that while "a portion of component inframarginal costs should be included in incremental costs of individual products, a large share should not be." Amazon Reply Comments at 21.

"less than the cost of the benefits…they receive" and other customers pay more to "make up for those losses." *Id.* at 2-3. Valpak contends that the Commission should examine all postal products that fail to cover their attributable costs "even if those products happen to exist within classes…." *Id.* at 5.

In response to commenters that do not recommend a change in the incremental cost test, UPS reiterates that the current incremental cost test only ensures that "the various customers…are being treated fairly;" it does not ensure that the Postal Service is fairly competing in the marketplace. UPS Reply Comments at 41 (emphasis omitted). UPS maintains that the existing test can be improved and supplemented with an order-neutral test for cross-subsidy. *Id.* at 42.

Additional Comments. While NNA asserts "costs should be charged accurately," and "the industry is in no condition to absorb the blows… [Proposal One or Proposal Two] would create" it "takes no position on many of UPS's specific proposals." NNA Reply Comments at 6. Overall NNA characterizes Proposals One and Two as part of UPS's "theory of fully-distributed costs" that NNA asserts would be better reviewed in a subsequent proceeding. *Id*. at 10. Specifically, NNA notes that "[i]n 2017, the Commission will embark upon a major reassessment of the workings of the rate-setting system created under the PAEA." *Id.* at 9. NNA implies that it considers the instant docket a kind of "rate review" and argues it would be "unwise" for the Commission to "begin the 2017 process here [(in the instant docket)]." *Id.* at 10.

C. Commission Analysis

The Commission begins its analysis of Proposal One with a discussion of the definition of inframarginal costs. It then discusses the various methods of calculating inframarginal costs and the issues surrounding UPS's proposed calculation. It also details the examination of the Postal Service's calculation of inframarginal costs in the context of incremental costs. The Commission then provides an analysis of the various

allocation proposals presented by UPS and finds that they rely on unverifiable assumptions. It concludes with the Commission's finding that Proposal One does not satisfy the section 3622(c)(2) requirement that a reliably identified causal relationship exists between inframarginal costs and products,[55] but that incremental costs, which include some inframarginal costs, do satisfy the section 3622(c)(2) requirement. The Commission also finds, pursuant to 3652(e), that the use of incremental costs represents a significant improvement compared to the existing methodology used for cost attribution and therefore adopts the use of incremental costs for cost attribution.

1. Defining Inframarginal Costs

Inframarginal costs are variable costs that are not volume-variable costs. Panzar Comments, Exhibit 2 at 11. In postal costing they represent the difference between total variable costs and volume-variable costs. Inframarginal costs together with common fixed costs comprise institutional costs.

Inframarginal costs occur as a result of the economies of scale and scope in a multi-product enterprise. As a result of economies of scale and scope, the marginal cost of individual units of volume (*i.e.*, mailpieces) decreases with volume. The unit volume-variable cost of a product is based exclusively on the marginal cost of the last piece of mail, which, by definition, has the lowest cost. The sum of the differences between the marginal cost of each piece and the marginal cost of the last piece is the

[55] Because Proposal One does not demonstrate a reliably identified causal relationship between inframarginal costs and the products to which it would attribute those costs, the Commission need not examine whether Proposal One meets the section 3652(e) requirements. However, because parts of Proposal One deal with the calculation of inframarginal costs separately from the attribution of such costs, the Commission discusses how the calculation of inframarginal costs would be evaluated under section 3652(e).

inframarginal cost.[56]

Some inframarginal costs are a component of a product's incremental costs. Because incremental cost represents the cost of providing a product as a whole (while marginal cost is the cost of providing each piece), incremental cost sums together the marginal cost of each piece of mail contained within the product. Therefore, if economies of scale and scope exist in the firm, the incremental cost of a product accounts for these by including the inframarginal costs of those pieces of mail.

In the instant proceeding, commenters agree on the definition of inframarginal costs, though ACMA and the Public Representative draw distinctions.[57]

2. Calculating Inframarginal Costs

a. Current Methodology

Inframarginal costs are not currently calculated by the Postal Service for the purposes of cost attribution, as they are a component of institutional costs. Consistent with the accepted cost attribution methodology, the Postal Service only calculates and attributes volume-variable and product-specific fixed costs and designates the residual costs as institutional.

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[56] This can be represented by the formula $\sum_{i=1}^{n}(MC_i - MC_n)$, where *i* is a piece of mail. Notably, this formula demonstrates that the last piece of mail has zero inframarginal cost. This is consistent with the definition of inframarginal cost as the difference between variable and volume-variable cost, because the sum of the marginal cost of each piece is the variable cost, and the marginal cost of the last piece, multiplied by the number of pieces, is the volume-variable cost.

[57] ACMA defines inframarginal costs as "…the difference in cost between two volume levels, minus a corresponding volume-variable cost [when calculated according to a long-run total cost function]." ACMA Comments at 26. This definition is not inaccurate but is specific to a long-run total cost function, where all costs are variable. The Commission's analysis of costing has historically focused on short-run cost functions, where costs are either fixed or variable. The Public Representative disputes the terminology surrounding volume-variable and inframarginal costs and proposes new ways of expressing these terms. He does not dispute, however, the underlying formulae for volume-variable and inframarginal costs, only the terms used to describe them.

The Postal Service does, however, calculate some inframarginal costs for its competitive products when testing for cross-subsidization. This calculation, however, is only for inframarginal costs that are part of competitive products' incremental costs. Postal Service Response to CHIR No. 6, question 1.

b. UPS's Proposed Methodology

UPS proposes that the Postal Service calculate all component inframarginal costs by applying a model developed by McBride. UPS relies upon McBride's model in developing inframarginal cost calculations for Fiscal Years (FYs) 2007-2014. *See* UPS-RM2016-2-NP1. Within the overall model, McBride develops models using Postal Service cost functions and data from the Cost and Revenue Analysis (CRA) matrix to calculate all inframarginal costs from the "Other" costs, (*i.e.,* institutional costs). McBride Paper at 6. Data are disaggregated to the cost component level to allow the "Other" costs to be divided between inframarginal costs and fixed costs, component by component. *Id.* Unlike UPS, however, McBride does not take the additional step of attributing these costs to products. *See id.*

The model assumes that many Postal Service cost components have a constant elasticity cost structure. *Id.* at 5. This assumption is necessary to determine the shape of the Postal Service's cost function across all levels of cost drivers and thereby calculate inframarginal costs at all levels of the cost driver. Using Postal Service component classification data from Docket No. R2006-1, McBride calculates that all of the "Other" costs of cost components with a constant elasticity assumption are inframarginal and that all of the "Other" costs of cost components without a constant elasticity assumption are fixed. *Id.* at 6. McBride acknowledges the potential weakness of this assumption, stating he felt:

> obliged to say that [he had] serious reservations about the lack of a consistent approach as well as documentation for the criteria used by the Postal Service to decide which

> components would be designated as constant elasticity components and which would not…It should be kept in mind when reviewing the numerical results for inframarginal costs.

Id. at 8.

In his comments, Bradley identifies several computational errors in McBride's model. Bradley criticizes McBride's calculation of inframarginal costs at the cost component level, rather than the more disaggregated cost pool level. Bradley Comments at 36. As a result, McBride does not account for certain cost pools which have 0 percent variability. *Id.* at 36-37. This computational error, Bradley asserts, results in a substantial overstatement of inframarginal costs. *Id.* at 37.

Correcting for the errors he identifies, Bradley calculates revised inframarginal costs, which include more recent classifications from the FY 2014 ACR. *See* USPS-RM2016-2-NP1. In his reply comments, Neels accepts Bradley's revision but disputes the classification of certain components. Neels Reply Comments at 19-21.

c. Commission Analysis of Calculating Inframarginal Costs

The model proposed by UPS for calculating inframarginal costs is a robust quantitative model, but it has two problems: the constant elasticity assumption and the cost classifications. Based on the following evaluation, the Commission concludes that the UPS method for calculating inframarginal costs does not meet the requirements of section 3652(e), *i.e.*, it does not remedy a significant inaccuracy or significantly improve the quality, accuracy, or completeness of Postal Service data or the attribution of costs or revenues to products, nor, in the judgment of the Commission, is it otherwise necessitated by the public interest. *See* 39 U.S.C. § 3652(e).

The constant elasticity assumption is central to Proposal One and, while useful for plotting the curve of a cost function across its entire cost driver, cannot be justified and, in some instances, requires other untenable assumptions. The constant elasticity

assumption may inaccurately represent the shape of the cost curve at very low levels of volume. This assumption lacks an empirical basis, as the Postal Service has not experienced the levels of volume necessary to verify this assumption. Applying the constant elasticity assumption to levels of volume far beyond the range of actual experience produces results that are inadequately supported and unreliable.[58]

This application of the constant elasticity assumption also requires that any cost pool or cost component with this assumption has absolutely no fixed costs.

For example, UPS's proposal treats the cost components that comprise "Postmasters EAS 23 & Below" as entirely attributable with no fixed costs.[59] This is an unreasonable assumption because postmasters must open, staff, and close post offices regardless of the amount of visitors or transactions the post office may receive. At least some of the costs incurred by these activities must be fixed in the short-run with respect to volume. Therefore, by utilizing the constant elasticity assumption and supposing that the component has no fixed costs, McBride's model results in an overstatement of the inframarginal costs of that cost component.

The Public Representative defends the constant elasticity assumption, stating that the Commission's adoption of mean volume to estimate city carrier load time variability is equivalent to a constant elasticity assumption. PR Reply Comments at 15-17. This comparison is inappropriate, however, because the usage of mean volume to estimate city carrier load time variability relied only upon observed volume. This contrasts with McBride's method, which assumes constant elasticity over the entirety of the cost function, rather than the smaller range of observed volume in the cost function.

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[58] Several commenters discuss these concerns and reach a similar conclusion. Amazon Comments at 86 (citing Thompson Comments at 26-30); Bradley Comments at 38; *see* Postal Service Comments at 16.

[59] *See* Motion of United Parcel Service, Inc. for Issuance of Information Request to United States Postal Service, February 19, 2016, Exhibit A.

An additional concern with Proposal One is in the classification of cost components as constant elasticity or fixed. As McBride notes, little documentation exists on how and why the cost pools and components are classified. McBride Paper at 8. While these classifications are used for the calculation of inframarginal costs and do not affect the calculations of volume-variable and product-specific fixed costs, they challenge the accuracy of McBride's model because components may be incorrectly classified.[60]

The Commission finds that the model proposed by UPS for calculating inframarginal costs does not meet the requirements of section 3652(e), *i.e.*, it does not remedy a significant inaccuracy or significantly improve the quality, accuracy, or completeness of Postal Service data, or the attribution of costs or revenues to products, nor, in the judgment of the Commission, is it otherwise necessitated by the public interest. *See* 39 U.S.C. § 3652(e). In addition, any overstatement of inframarginal costs as part of those costs that are attributed to products runs contrary to prior legislative intent concerning cost attribution.[61]

3. Incremental Cost Calculation

As indicated previously, the Postal Service's calculation of competitive products' incremental costs includes some inframarginal costs. Postal Service Response to CHIR

[60] The concerns about correct classification of components are further discussed in chapter V on Proposal Two.

[61] *See* H.R. Rep. No. 109-66, pt. 1, at 49 (2005) ("In addressing the attributable costs, the Commission should continue to focus on the need to have reliable indicators of cost causality. This Committee heard testimony from differing viewpoints, with some urging a higher attribution of costs. The goal of the Commission should be a technically correct result, placing accuracy above achieving a particular outcome of higher or lower attribution."); S. Rep. No. 108-318, at 9-10 (2004) ("The Committee heard testimony suggesting that currently accepted levels of cost attributions were both too low and too high, and that specific rules for cost attribution should be incorporated into law. The Committee has decided that the technical decision of what cost analysis methodologies are sufficiently reliable at any given time to form the basis for attribution should be left to the Postal Regulatory Commission, acting with benefit of counsel from all interested persons in open public proceedings").

No. 6, question 1. This methodology for calculating incremental costs, as well as some inframarginal costs, was approved by the Commission in Order No. 399. Docket No. RM2010-4, Order No. 399 at 3-5, 14. This methodology differs from UPS's proposed methodology in that it does not calculate *all* inframarginal costs; rather, it only calculates inframarginal costs that are a part of a product's incremental cost.

a. Methodology

In Order No. 399, the Commission approved an incremental cost methodology presented by the Postal Service. *Id.*

In Docket No. R2000-1, Postal Service witness Bradley explained that the calculation of incremental costs is very similar to the calculation of attributable costs and asserted that the essential difference in the calculation is that "[a]ttributable costs incorporate only the cost of the last unit produced [(*i.e.,* marginal cost)], whereas incremental costs incorporate the costs of all of the units produced." USPS-T-22 at 15. Bradley explained that in an incremental cost calculation, the marginal cost for each unit of a product's cost driver is calculated to determine that product's incremental costs. In contrast, an attributable cost (volume-variable cost) calculation uses only the marginal cost of the last unit and multiplies that cost by the number of a product's cost drivers. *Id.* at 16.

This method of calculating incremental costs is specifically used for components that are neither 0-percent attributable nor 100-percent attributable, for which the incremental cost will exceed the attributable cost (volume-variable cost). *See id.* at 17-18.

Bradley further explained that his method for calculating incremental costs uses only the parameters (*i.e.,* elasticities) from the models used to estimate component level variability. This is a constant elasticity assumption because it applies the elasticity at one level of the cost function to every level of the function. He stated that using this is

preferable to using the component level models because the models may have to be used for ranges of volume in which they have not been empirically tested. *Id.* at 45. He also asserted that assuming constant elasticity for the range of incremental cost calculation is empirically justified. *Id.* at 45-46. He noted that when calculating incremental costs at the subclass (product) level, only up to 50 percent of volume is avoided—an amount for which the constant elasticity assumption has been empirically tested. *Id.* at 46.

b. Commission Analysis of Incremental Cost Calculation

The model discussed above incorporates inframarginal costs as part of the calculation of incremental costs but is limited to the inframarginal costs that can be causally linked to a specific product. The amount of inframarginal costs can be calculated as the difference between the attributable cost and the incremental cost of a specific product.

Like UPS's proposed method, this method uses a constant elasticity assumption to model cost components, but it avoids the issues facing UPS's proposed method by restricting itself to limited amounts of volume (*i.e.,* the volume of each product).[62] By calculating only the incremental inframarginal costs, the Postal Service's model only estimates inframarginal costs in a very small range of a component's cost curve where the constant elasticity assumption has been empirically verified based on observed volumes.[63] The Postal Service does not attempt to calculate the inframarginal costs of an entire component.

[62] The Public Representative, on reply, supports this application of constant elasticity. PR Reply Comments at 15.

[63] Michael D. Bradley, Jeff Colvin, & John C. Panzar, *Issues in Measuring Incremental Cost in a Multi-Function Enterprise*, in Managing Change in the Postal and Delivery Industries 3-21 (Michael A. Crew & Paul R. Kleindorfer eds., 1997).

This model for incremental cost calculation accurately calculates the inframarginal costs that can be causally related to a product's provision as a whole. These causally related costs can only be calculated through the development of incremental costs. In summary, UPS's proposed model assumes away any possible fixed costs for the components in which it calculates inframarginal costs and assumes a cost curve that cannot be empirically verified. The Postal Service's incremental cost model does neither.

4. Allocating Inframarginal Costs

a. Shapley Value-Based Allocation

(1) Shapley Values Defined

Shapley values are a concept developed in game theory, designed to allocate payoffs to participants in a cooperative game (the analogy would be Postal Service cost attribution). This game can have any number of potential outcomes, some of which may be more efficient than others. The outcome of the game depends on the participation, or addition, of each participant to his or her grouping, which is the given set of cooperating participants in the game.[64] The Shapley value for a given participant is calculated by taking the average of his or her contributions across all possible groupings, assuming that each grouping is equally likely to occur. *Games of Strategy*, 573-574. The Shapley value is an *average* that relies on the assumption that each outcome is equally likely, though weighted Shapley values can be used to modify that assumption. Unweighted Shapley values have also been proposed to allocate the costs of a joint project among its participants and are now being proposed by UPS for the Postal Service.

[64] As applied to the Postal Service analogy, the "participation" of each piece would depend on its effect on the total cost of the Postal Service, which in turn depends on its place on the cost curve.

(2) Shapley Values as Part of Proposal One

(a) Methodology

Proposal One seeks to use Shapley values to allocate inframarginal costs to products. The addition each product, or mailpiece, makes to inframarginal costs depends on its order in the marginal cost curve. Each possible ordering of products on a marginal cost curve represents a different possible outcome. The mailpieces that comprise these products, however, are not all processed together. Neels demonstrates this scenario in his report. Neels Report at 26. Using products in a Shapley allocation can result in a computationally complex process that would be infeasible for anything but modern supercomputers. *See id.* at 26-27. As a result, Neels proposes using the product-agnostic cost driver as the participants in the Shapley allocation.[65]

With the cost driver as the unit of analysis, the average addition by each mailpiece can be calculated as the average of the inframarginal cost at each possible location of that cost driver in the marginal cost curve, assuming that all possible locations are equally likely. This is equivalent to creating a unit inframarginal cost for the component, defined as the total component inframarginal costs divided by the number of cost drivers, and allocating that amount to each cost driver. The cost driver is then assigned to products using distribution keys, component by component, to create product-level inframarginal costs. This allocation, Neels states, is equivalent to allocating inframarginal costs using the distribution keys for a given component. *Id.* at 28. UPS uses this alleged equivalence to defend the rigor of Proposal One. UPS Reply Comments at 30-31.

[65] *Id.* at 27. Calculating Shapley values at the cost driver level is done before any application of distribution keys to cost components to develop product costs.

(b) Commission Analysis of Shapley Value Allocation

The Commission discussed a version of Shapley values once before, in Docket No. R94-1, when the topic of Aumann-Shapley pricing was introduced.[66] Aumann-Shapley prices were touted as a set of prices that ensured that all costs, both attributable and institutional, were covered (ensuring no cross-subsidization). *Id.* ¶ 124. These prices were also identical to fully distributed cost prices "allocated on the basis of attributable cost shares." *Id.* The Commission chose not to implement any of the uniform pricing approaches proposed in that proceeding, including Aumann-Shapley prices, because while each of these proposals provided guidance on specific policy goals, the Commission was required to balance all of the pricing objectives when recommending rates. *Id.* ¶¶ 153-154. Nevertheless, it noted that the usefulness of these approaches depends on the regulator's objective and expressed interest in the possibility of Aumann-Shapley prices to prevent cross-subsidy. *Id.* ¶¶ 125, 163.

Rather than using the Aumann-Shapley method to allocate all costs, thereby engaging in fully distributed costing, Proposal One seeks only to allocate inframarginal costs. Additionally, while Aumann-Shapley prices are calculated based on product-level costs, Proposal One emphasizes the use of cost drivers, which is more feasible computationally and more reflective of the Postal Service's activity-based costing.

Multiple commenters oppose the use of Shapley values. They cite the lack of a causal link between inframarginal costs and volume and note that it is only one of many different possible allocations of costs. Panzar Comments at 17; Bradley Comments at 24; ACMA Comments at 39-40; NALC Reply Comments at 2; Market Dominant Mailers Comments at 10-13. Amazon and Panzar also note that allocating costs using Shapley

[66] *See* Docket No. R94-1, Opinion and Recommended Decision, November 30, 1994, Appendix F, ¶¶ 122-125.

values would result in economically inefficient prices. Panzar Comments at 17; *see* Amazon Comments at 90, 91-92. Economic efficiency would require the Postal Service to set a price at a product's marginal cost. Using any other point for rate setting sends inefficient pricing signals which could result in lost volume, lost revenue, or the withdrawal of profitable products.

The Commission notes a major concern with the usage of Shapley values: the assumption that any possible ordering is equal. Under Proposal One, a particular unit of a cost driver (*e.g.,* a specific piece of mail) is considered equally likely to be at any point in a marginal cost curve. However, this assumption is unsupported. It is possible that the ordering of the units of the cost driver within the marginal cost curve is not random, which would make allocation of inframarginal costs inaccurate when a distribution key is applied. While cost drivers may be product-agnostic, they are not necessarily order-agnostic, and such an assumption is empirically unverifiable.

Additionally, the Shapley process is an averaging process, taking the mean inframarginal cost of every point on the marginal cost curve. To the extent that a causal relationship between inframarginal costs and products may exist, the averaging process weakens and may fully eliminate it. While the Commission approved the use of mean volume to evaluate component variability in the past, the use of the mean was justified as more representative of the cost function.[67] Proposal One instead uses mean volume as a computational technique to consolidate the set of all possible orderings.

The use of the Shapley value in Proposal One makes an unverifiable assumption about the ordering of cost drivers in a cost component, and it relies on averaging the set of all possible orderings to allocate inframarginal costs. While weighted Shapley values may be more reliable in concept, there is no information in the record that supports the

[67] *See* Docket No. R87-1, Opinion and Recommended Decision, Volume 1 of 2, March 4, 1988, ¶¶ 3419-3421 (Docket No. R87-1 Vol. 1 Opinion).

use of any specific weights. The development of such weights is further complicated by the operational complexity of the Postal Service (*e.g.*, knowledge of the order or mail processing at plants). For these reasons at this time and based on the record before it, the Commission finds that Shapley values do not reliably identify a causal relationship between inframarginal costs and products as required by section 3622(c)(2) and therefore are not an appropriate means of allocating inframarginal costs.

b. Distribution Key-Based Allocation

(1) Methodology

In its Petition, UPS proposes that the Commission allocate inframarginal costs using the pre-existing distribution keys for each cost component. Petition, Proposal One at 19-21. As previously discussed, each cost component has a distribution key which relates the volume-variable costs of that component to products based on the cost driver involved. In most cases the cost driver is volume, so volume-variable costs are proportionate to product volume. For some components, however, other cost drivers are used (*e.g.,* weight, cubic feet, etc.), so costs will be attributed to products proportionate to their amounts in the cost driver. UPS proposes that the inframarginal costs in each component be attributed in the same way as the volume-variable costs for that component.

(2) Commission Analysis of Distribution Key Allocation

The use of distribution keys to allocate inframarginal costs relies on a crucial assumption: Proposal One "use[s] those same distribution keys for the same purpose for which they are used today…except it would apply them to *all* variable costs…." *See* UPS Reply Comments at 6 (emphasis in original). In effect, the proposal assumes that inframarginal costs are incurred in the same proportion as volume-variable costs in each component.

The analysis provided by UPS fails to establish the validity of this assumption. When observing a marginal cost curve with constant elasticity, inframarginal costs are not accrued in the same proportion as volume-variable costs. This is demonstrated in Figure IV-1 below.

Figure IV-1

Component Marginal Cost Curve

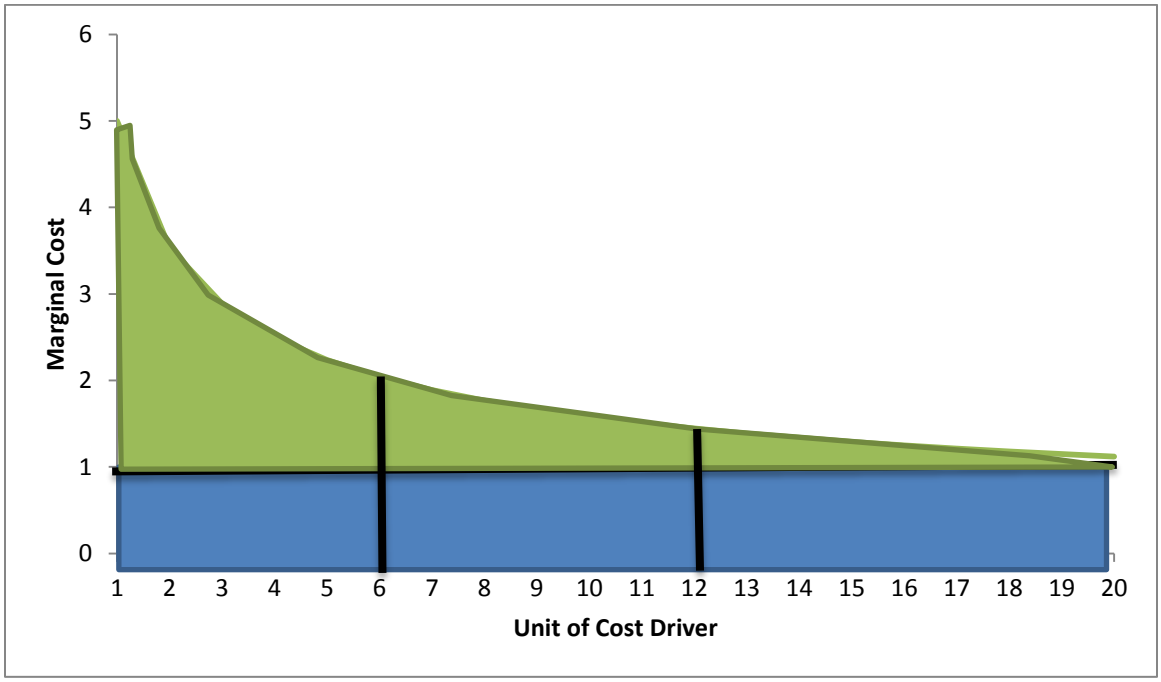

Figure IV-1 represents the marginal costs for a cost component with three products as represented by the three areas separated by vertical bars. The first product is responsible for six units of the cost driver; the second product is responsible for six units of the cost driver; and the third product is responsible for eight units of the cost driver. The blue rectangular area at the bottom represents volume-variable costs, and the green area on top represents inframarginal costs. Under the current cost attribution system, the area in blue is attributed to products in the proportions shown above as volume-variable costs. Under Proposal One, the inframarginal costs would be attributed

in the same proportions, even though Figure IV-1 demonstrates that those costs were not incurred in the same proportion as volume-variable costs. This illustrates a key characteristic of volume-variable costs: they are the minimal marginal costs that are incurred at every level of cost driver and can therefore be attributed by a distribution key.

Furthermore, there are multiple ways in which cost drivers can be ordered. The Postal Service does not precisely know the order in which it handled each product. Returning to the hypothetical in Figure IV-1, it is entirely possible that the product that is responsible for eight units of the cost driver is the first product handled, which would change the amount of inframarginal costs "incurred" by each product.[68] The uncertainty associated with the order of cost drivers renders the pre-existing distribution keys inaccurate for the purpose of allocating inframarginal costs.

The conclusion stated above is consistent with prior Commission analysis of proposals to apply distribution keys without clear causal relationships, or treating them as causal themselves. In Docket No. R80-1, the Commission rejected a proposal to distribute the costs of functional activities by their relative use by classes of mail without clear signs of cost causation. *See* Docket No. R80-1 Opinion Vol. 1, ¶¶ 0449-0452. The Commission stated that "[d]istribution keys have an existence of their own, independent of causation. They are nothing more than mathematical formulae. Their use must be preceded by an analysis of causation. The use of a formula to distribute costs cannot by itself establish or create a causal relationship." *Id.* ¶ 0451 (footnote omitted) (emphasis in original). The Commission further stated that it "continue[s] to require the establishment of causation on some basis before choosing a distribution key." *Id.* ¶ 0451 n.2 (emphasis in original). The underlying requirement of causation

[68] This stands in contrast to the current allocation of volume-variable costs, where a change in the product order does *not* affect the attribution of volume-variable costs.

remains unchanged and would need to be proven in order to allocate inframarginal costs.[69] Multiple commenters in this proceeding agree with this requirement of causation. *See* Panzar Comments at 16; Market Dominant Mailers Comments at 13; ACMA Comments at 32. Applying a distribution key to a set of costs without a causal basis would result in an inappropriate attribution of costs to products.

The Public Representative defends the use of distribution keys to allocate inframarginal costs, arguing that it is no different from using distribution keys to allocate volume-variable costs because both contain common costs. PR Reply Comments at 7-8. While it is technically accurate that both volume-variable and inframarginal costs contain common costs, the mere presence of common costs in both does not mean that the same distribution keys can be used to allocate them. Marginal costs, which are identical to unit volume-variable costs, include the *change* in common costs caused by the production of a specific unit of mail. This causal link does not exist for inframarginal costs, which represent variable costs that *do not* vary with volume. The Postal Service echoes this criticism in its reply comments, stating that using distribution keys for inframarginal costs would "produce[] an undefined and misleading cost measure." Postal Service Reply Comments at 25.

The Public Representative also argues that the Postal Service uses distribution keys to allocate inframarginal costs in the calculation of incremental costs. PR Reply Comments at 22-23. This, however, overstates the role of distribution keys in the calculation of incremental costs. The Postal Service does not use distribution keys to calculate inframarginal costs; rather, it uses them to calculate the amount of incremental costs incurred by a product by multiplying each unit of volume by the marginal cost of providing that specific unit. A distribution key would only be used to ensure that the

[69] *See* PRA section 3622(b)(3); PAEA section 3622(c)(2); *see also NAGCP*.

accurate amount of volume is used in the calculation and would not be used specifically for allocating inframarginal costs.

Basing the allocation of inframarginal costs to a product on pre-existing distribution keys relies on the unverifiable assumption that the proportion of inframarginal costs incurred by that product is identical to the proportion of the cost driver of that product. Before using a distribution key for attribution, a reliably identifiable causal relationship must first be found. UPS has not provided evidence of a reliably identified causal relationship between the pre-existing distribution keys and inframarginal costs as required by section 3622(c)(2). It is possible that other distribution keys may reliably identify a causal relationship between inframarginal costs and products, but UPS has not presented any other possible set of distribution keys. As a result, pre-existing cost component distribution keys are not appropriate for the allocation of inframarginal costs.

c. Incremental Cost-Based Attribution

(1) Methodology

In an incremental cost-based attribution, some inframarginal costs are allocated to products as part of the incremental cost calculation as explained above in section IV.C.3.

(2) Commission Analysis of Incremental Cost-Based Attribution

This method of attributing inframarginal costs is narrower in scope when compared to the other methods discussed or proposed by UPS, which allocate all inframarginal costs to products. As a result, the allocations proposed by UPS overstate the amount of inframarginal costs generated by each product. Allocating only the inframarginal costs that are part of a product's incremental costs limits allocation to

those inframarginal costs caused by providing a specific product. It does not attempt to allocate the entirety of inframarginal costs to products based on methods that do not satisfy the reliably identified causal relationship requirement. Panzar and Valpak support this method of allocation and recommend adopting it as the basis for cost attribution. Panzar Comments at 15; Valpak Comments at 15-16; Valpak Reply Comments at 25-26.

The Public Representative disputes the accuracy of the Postal Service's incremental cost attribution, as he believes that the Postal Service incorrectly excludes common costs from its incremental cost function and argues that including them should result in the same result as Proposal One. PR Reply Comments at 18-21. However, incremental costs do not exclude all common costs, but only those without a reliably identified causal relationship to the product. Incremental costs measure the change in both common and product-specific costs that result from providing a product as a whole, just as marginal costs measure the change in both common and product-specific costs that results from providing a single piece of mail.[70]

Using incremental costs to allocate inframarginal costs is appropriate, as the incremental cost-based allocation is restricted to only those inframarginal costs which have been causally related to the provision of a product through a clear and supported methodology as required by section 3622(c)(2). While it does not allocate all inframarginal costs, it provides a calculation of all inframarginal costs that can be reliably identified and are causally related to each product.[71] Furthermore, because the use of incremental costs allocates those inframarginal costs that have reliably identified causal relationships to products, the Commission finds that the use of incremental costs

[70] The Postal Service supports this view. Postal Service Reply Comments at 19-20.

[71] Specifically, by estimating inframarginal costs for a relatively narrow range of volumes, the incremental cost calculation does not depend on applying the elasticity beyond the empirically verifiable range.

represents a significant improvement over the existing methodology pursuant to section 3652(e)(2).

5. Application of Legal Standard to Proposal One

a. Statutory Requirements

As discussed in multiple instances above, section 3622(c)(2) requires that costs be attributed through "reliably identified causal relationships." *See* 39 U.S.C. § 3622(c)(2). Further, section 3652(e)(2) requires that the Commission also find that a proposed methodology remedies a significant inaccuracy or significantly improves the quality, accuracy, or completeness of Postal Service data or the attribution of costs or revenues to products, or, in the judgment of the Commission, is otherwise necessitated by the public interest. 39 U.S.C. § 3652(e)(2).

As discussed above, the first issue concerning the acceptance of Proposal One is whether the relationship between inframarginal costs and products is both causal and reliably identifiable. The issue of causality is a question in the abstract about relationships but may be answered with both logical and empirical arguments. The question of reliable identification is one that can only be answered empirically.

The second issue concerning the acceptance of Proposal One is whether it meets the criteria of section 3652(e)(2). For Proposal One to meet these criteria, it must, at a minimum, be an improvement to the established methodology.

b. Commission Analysis of the Reliably Identified Causal Relationships

Several commenters argue against the idea that inframarginal costs have a reliably identified causal relationship with products. Amazon and Panzar maintain that only costs that are brought into existence by a particular product can be causally related (*i.e.*, marginal or incremental costs). Amazon Comments at 81; Panzar Comments at 4-

5, 12-13. They argue that inframarginal costs are jointly caused by products and cannot be traced to individual products. Amazon Comments at 81-82; Panzar Comments at 11-13. The Postal Service and the Market Dominant Mailers also assert that Proposal One violates the causation principle of attributable costing. Postal Service Comments at 5; Market Dominant Mailers Comments at 3. The Public Representative, in contrast, believes that a causal relationship exists between inframarginal costs and products, just as one does between volume-variable costs and products. PR Comments at 25-27. He also asserts that the evidence for these links is the same. PR Comments at 26.

The first part of the test for attribution is the existence of a causal relationship, thus the first question is whether inframarginal costs are caused by products.

To answer this question, it is necessary to consider how inframarginal costs arise. These costs theoretically exist in any firm that exhibits economies of scale, regardless of the amount of products the firm provides. A multi-product firm like the Postal Service has greater difficulty determining cost causality because of economies of scope and common costs (*i.e.*, costs incurred by multiple products). Because of the difficulties of attributing common costs to products, a multi-product firm cannot easily create an average total cost figure.

In a multi-product firm like the Postal Service, marginal cost can be used to develop a causal link because marginal cost represents the change in total costs from the production of a single additional unit of volume.[72] Because marginal costs measure the change in total costs, they include whatever changes in common costs occur because of an individual piece of mail.[73]

[72] This is, effectively, the derivative of the total cost function.

[73] The Postal Service and Panzar support this analysis. Postal Service Reply Comments, Appendix A at 1-8; Panzar Reply Comments at 10-17.

A product-level increment also can be analyzed in a multi-product firm.[74] If the cost function accurately represents the total costs of the firm (or cost component), then this product-level marginal cost represents the entire set of costs caused by the addition of a product.[75] This product-level marginal cost is also known as incremental cost and shall be used to determine attribution of costs. Similarly, class-level incremental costs shall be used to determine the attribution of costs to classes.[76]

Incremental costs contain a portion of what UPS identifies as inframarginal costs. The volume-variable costs calculated for a product represent the marginal cost of each piece of mail in the product if they were all produced as the last piece of mail on the cost curve. In a firm without economies of scale and scope, that may encompass all causally related costs. However, the Postal Service exhibits economies of scale and scope, so further attribution is necessary to capture all causally related costs. The difference between the volume-variable costs and the incremental costs of a product can be thought of as causally related inframarginal costs (and product-specific fixed costs). In this way, the calculation of incremental costs identifies the portion of inframarginal costs that have a causal relationship with products, which can be measured using the incremental cost test.[77]

Having determined that some inframarginal costs are causally related to products, it is necessary to determine whether Proposal One reliably identifies these costs and their relationships to products. As discussed in the sections above, both the

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[74] This is, effectively, the derivative of the total cost function with respect to product, rather than mailpiece, as is done for marginal cost.

[75] Contrary to the Public Representative's arguments, this would include any changes in common costs. While both volume-variable and inframarginal costs do contain common costs, the key to a causal relationship is the extent to which common costs change with the provision of a mailpiece or product.

[76] *See* 39 U.S.C. § 3622(c)(2), which requires the attribution of costs to "each class or type of mail service."

[77] The Postal Service also supports this argument. Postal Service Response to CHIR No. 6, question 1.

calculation and allocation of inframarginal costs proposed by UPS rely upon unverifiable assumptions. Proposal One's calculation of total inframarginal costs relies on a constant elasticity assumption that overstates inframarginal costs by assuming that certain components have no fixed costs. Proposal One's allocation of inframarginal costs, whether by distribution key or Shapley values, relies on unverifiable assumptions about the applicability of pre-existing distribution keys or the averaging of inframarginal costs, which results in an over-attribution of those costs.

The Commission, therefore, finds that Proposal One fails to reliably identify a causal relationship, as required by section 3622(c)(2), between all of the inframarginal costs it seeks to attribute and products. In addition, Proposal One, because it does not reliably identify a causal relationship between inframarginal costs and products, cannot represent an improvement over the incremental cost methodology as required by section 3652(e)(2). The Commission, in the remainder of this chapter, reviews how to best identify and allocate those reliably identified and causally relatable inframarginal costs using the incremental cost test.

6. Testing for the Cross-Subsidization of Products

a. Current Incremental Cost Test

(1) Criticisms

UPS criticizes the incremental cost test because it uses an order-centric approach. Petition, Proposal One at 21-22. By assuming that the product tested is the last unit added or removed, UPS asserts, the product receives the benefits of economies of scale and scope over other products. *Id.* at 11-12. UPS therefore recommends an order-neutral test for cross-subsidization by applying Proposal One. *Id.* at 25. If a product covers its costs under Proposal One, then it is not cross-subsidized under an order-neutral test. UPS further notes that the incremental cost test focuses on

whether customers are being treated fairly but does not ensure that the Postal Service is competing fairly in the marketplace. UPS Reply Comments at 41.

Several commenters defend the incremental cost test. Both NPPC and Valpak assert that the incremental cost test is the appropriate test for cross-subsidization and should be expanded for market dominant products. NPPC Comments at 4-9; Valpak Reply Comments at 2-4, 7. The Postal Service notes that in an incremental cost test, each product receives the benefits of economies of scale and scope, regardless of which product is being tested. Postal Service Comments at 21-22.

(2) Commission Analysis of Criticisms

UPS offers two criticisms of the incremental cost test: that it unfairly gives the tested product the benefit of economies of scale and scope and that it does not ensure the Postal Service is fairly competing in the marketplace. Petition, Proposal One at 14-15, 25. The Commission rejects both of these criticisms as explained below.

The incremental cost test, by definition, tests the change in total costs from providing a product, just as marginal cost examines the change in total costs from providing a piece of mail. As the product is tested, it is assumed that it is at the end of the marginal cost curve because it is being added to (or removed from) the mix of products the Postal Service provides to determine whether or not the costs incurred by the addition of the product exceed the product's revenues. Furthermore, this assumption applies to any product whose incremental cost is being calculated, whether market dominant or competitive.

Additionally, even if the order of products were to change, the area under the curve of the cost function (the incremental cost) remains the same because the

calculation of incremental cost test is a difference test: the difference between the total costs of the enterprise and the total costs without one product.[78]

The purpose of the incremental cost test is not to ensure that the Postal Service is competing fairly in the marketplace. It is explicitly designed to protect captive mailers from subsidizing competitive products and ensure that products cover all of the costs the Postal Service incurs in providing them. It is unclear how UPS interprets the incremental cost test as a means to ensure fair competition. Section 3633(a)(1) makes no mention of it.[79]

The incremental cost test effectively tests for cross-subsidy of products, and UPS's criticisms of it based on its ordering are unfounded. Indeed, the incremental cost test precisely tests for cross-subsidy as incremental costs are the entire set of costs that a product incurs, including those inframarginal costs attributable to it.

b. Testing for Cross-Subsidization Under Proposal One

(1) Methodology

Under Proposal One, UPS states that cross-subsidization would be fully prevented. Cross-subsidization occurs when a product does not fully cover its own costs and is therefore being subsidized by another product. Section 3633(a)(1)

[78] To simplify the calculation, the incremental cost test assumes that the product whose incremental cost is being measured is at the end of the marginal cost curve. Alternatively, if the product were assumed to come first on the curve, after its removal the cost function would effectively "reset" and begin at the first unit of the remaining volume produced, which would then generate the higher inframarginal costs previously generated by the removed product. The resulting incremental cost would be the same as assuming the removed product is at the end of the marginal cost function.

[79] In contrast, other statutory provisions expressly address private sector competition. *See, e.g.,* 39 U.S.C. § 3622(c)(3) (stating that the Commission shall take into account the effect of rate increases on "enterprises in the private sector engaged in the delivery of mail matter other than letters") and 39 U.S.C. § 3642(b)(3)(A) (stating that due regard is to be given to "the availability and nature of enterprises in the private sector engaged in the delivery of the product involved").

prohibits competitive products from being subsidized by market dominant products (*i.e.*, captive mailers). By attributing all inframarginal costs, UPS asserts that products which can cover their volume-variable costs, product-specific fixed costs, and inframarginal costs are not being cross-subsidized.

(2) Commission Analysis of Cross-Subsidy Testing Under Proposal One

While it is accurate that Proposal One would ensure products would not be cross-subsidized, the costs tested would go beyond the level required for determining cross-subsidy. The incremental cost test is the appropriate test for cross-subsidy pursuant to Order No. 399. Proposal One would raise attributable costs beyond incremental costs, so it is unclear if a product that fails a cross-subsidy test based on Proposal One is actually being subsidized by other products. Panzar indirectly illustrates this in his reply comments in showing the differences between volume-variable, incremental, and inframarginal costs. Panzar Reply Comments at 2-10. UPS's proposed test for cross-subsidy attributes costs to products without a clearly identifiable causal relationship. The result would be overstated costs, which could force the Postal Service to raise prices or stop offering products that are not truly cross-subsidized, depriving them of revenue and volume. For these reasons, it is inappropriate to use Proposal One as a test for cross-subsidization of products.

D. Conclusion and Summary of Commission Findings

Based on analysis of the material submitted in this proceeding, the Commission finds that Proposal One does not present a reliably identified causal relationship between inframarginal costs and products pursuant to section 3622(c)(2), nor does it improve the reliability, accuracy, or usefulness of the Postal Service's data pursuant to section 3652(e)(2). Proposal One seeks to improve this attribution, but rather over-

attributes costs to products, beyond what can be shown to have a reliably identifiable causal relationship to the product.

Throughout this analysis, the Commission has noted both the reliably identified causal relationship between incremental costs and products and the accuracy and reliability of using incremental costs for cost attribution. The analysis also notes that incremental costs significantly improve the accuracy of the attribution of costs to products because they include inframarginal costs that are causally related to products, and the current methodology for attribution does not. However, the Postal Service does not currently use incremental costs for cost attribution. It is therefore appropriate to change the Postal Service's costing methodology to better reflect general principles of economic costing. Specifically, the Commission now interprets attributable costs to mean the incremental costs of a class or product. The mechanics of calculating class-level or product-level incremental costs have already been approved by the Commission.[80]

Notably, several commenters agree that the Postal Service should adopt incremental costing for cost attribution. NPPC takes no position as to whether the Commission should redefine attributable costs to mean incremental costs, but notes that incremental costs are the proper measure to test for cross-subsidy. NPPC Comments at 6. Panzar asserts that the Postal Service should use incremental costs for cost attribution. Panzar Comments at 7-10. Valpak also argues that incremental costs should be used for cost attribution for both market dominant and competitive products. Valpak Reply Comments at 25. The Postal Service suggests that

[80] *See* Docket No. ACR2015, Library Reference USPS-FY15-NP10, December 29, 2015, which includes the calculation of incremental costs for competitive products as a whole. With modification, these spreadsheets can also calculate the incremental costs for individual market dominant classes and products and competitive products.

incremental costs should be "used to determine if a product's revenue exceeds its total cost." Postal Service Reply Comments at 34.

Using incremental costs for attribution need not alter the Postal Service's pricing strategy, nor should it. While each product's attributable cost will be equal to its incremental cost, marginal costs should remain the Postal Service's basis for setting prices, with the application of appropriate markups to ensure that each product covers its incremental costs and provides an appropriate share of institutional costs. Effectively, the average price of a product should meet or exceed the product's average incremental cost (the incremental cost divided by the number of pieces). This would result in products having a cost coverage of 100 percent or greater. In addition, the calculation of avoided costs associated with worksharing discounts is not altered by the attribution of incremental costs. Unit avoidable costs should be based on marginal costs that are worksharing-related, and therefore exclude inframarginal or product-specific fixed costs.

The instant docket has presented an opportunity to evaluate the Postal Service's costing methodologies and revise them. The Commission appreciates UPS's efforts to seek new and improved ways to attribute postal costs. Based on the evidence provided and information available, the Commission is unable to adopt Proposal One because it lacks the requisite showing under section 3622(c)(2) that inframarginal costs can be attributed through reliably identified causal relationships. Because Proposal One does not demonstrate such relationships, it cannot be an improvement over the existing methodology pursuant to section 3652(e)(2).

Based on the Commission's findings that incremental costs can be linked to products through reliably identified causal relationships and that the use of an incremental costs methodology represents a significant improvement from the current attribution methodology, the Commission must require the Postal Service to attribute those costs. *See* 39 U.S.C. §§ 3622(c)(2), 3631(b), 3633(a)(2), and 3652(e)(2).

Attributable costs shall now include those inframarginal costs calculated as part of a product's incremental costs, as well as volume-variable costs and product-specific costs. Further opportunities to refine component-level methodologies and variabilities may be explored in the future with better models and better analysis. Similarly, the Postal Service's method for calculating incremental costs could also be improved, and the Commission welcomes proposals to improve it.

V. PROPOSAL TWO

A. Overview

1. Description of Proposal Two

a. Summary

Proposal Two seeks to change the way the Postal Service classifies its institutional costs. Petition at 7, 10-11; *see generally id.* Proposal Two. UPS argues that a significant portion of institutional costs currently classified as fixed include fully or partially variable costs and therefore should be attributed to products. Petition at 10; *id.* Proposal Two at 1, 8-11. UPS maintains that "the Postal Service should not be permitted to treat costs as 'fixed' unless it can demonstrate that they are, in fact, fixed using sound econometric methods." Petition, Proposal Two at 1. In Proposal Two, UPS argues that Neels's regression analysis identifies 37 cost components that contain fixed costs that include fully or partially variable costs ("hidden variable costs") and for which the Postal Service should be required to change the classification of costs.[81]

[81] *Id*. Proposal Two relies on an econometric analysis performed by Neels. *See id.* at 6-11; Neels Report at 31-51. *See also* Library Reference UPS-RM2016-2-LR-NP1, October 8, 2015.

b. Rationale

UPS states that if variable costs are erroneously treated as institutional costs, these costs are not being attributed to products. Petition at 7-8, 10; *id.* Proposal Two at 5. UPS asserts that the alleged misclassification of costs creates two major problems. First, UPS argues that such misclassification results in the cross-subsidization of competitive products by market dominant products, in violation of 39 U.S.C. § 3633(a)(1). Petition, Proposal Two at 5. Second, UPS maintains that such misclassification makes it impossible for the Commission to correctly determine whether competitive products generate enough revenue to cover their attributable costs. *Id.* at 5-6. UPS claims that the Postal Service currently categorizes its costs based on "its own subjective...judgments." *Id.* at 6. UPS argues that, under the PAEA, "the Commission cannot allow the Postal Service to treat costs as fixed in the absence of a reliable demonstration that the costs are actually fixed." *Id*.

c. Econometric Justification

UPS and Neels suggest that the costs the Postal Service currently treats as fixed might not remain fixed as volume changes. *Id.*; Neels Report at 31. To test their argument, UPS and Neels examine what they call "the great 'natural experiment'" of the past 7 years in which mail volumes have significantly declined. Petition, Proposal Two at 6; Neels Report at 31. Neels proposes that in response to historic declines in mail volumes, "fixed costs remain fixed" and do not change over time. Neels Report at 31. Accordingly, Neels maintains that if the "natural experiment" does not confirm this proposition, the Postal Service's costing procedures might be inaccurate. *Id.*

To test the Postal Service's classification of costs, Neels performs econometric analysis at two levels: the enterprise level, where he focuses on overall costs of the Postal Service, and the component level, where he examines costs for the cost components identified in the Postal Service's FY 2014 CRA report. Neels Report at 31-

36, 40-46. As a modeling tool, for both types of analysis, Neels applies a simple linear regression model with the inflation-adjusted fixed cost measure set as the dependent variable and a function of the weighted volumes measure set as the independent (explanatory) variable. Neels's regression model includes eight annual observations for the period of FY 2007 through FY 2014.[82] In his calculation of fixed costs, Neels relies on McBride's methodology for cost calculations.[83]

Neels concludes that his enterprise-level regression analysis indicates the Postal Service's "[fixed costs] exhibit a strong tendency to vary with changes in volume." Neels Report at 40. Neels concludes that the costs the Postal Service regards as fixed are not actually fixed and "contain large volumes of 'hidden' variable costs." *Id.* at 39-40. UPS therefore argues that "there is a serious problem with Postal Service cost methodologies." Petition, Proposal Two at 8.

Neels also conducts a component-level regression analysis for 84 CRA cost components that "reportedly have some fixed costs," to identify which cost components contain hidden variable costs. *Id.* at 9. For 37 cost components, Neels concludes that his regressions identify statistically significant relationships between costs that are "supposed to be fixed" and mail volume.[84] Based on the regression analysis, Neels and UPS conclude that fixed costs for these cost components contain hidden variable costs. Petition, Proposal Two at 10-11; Neels Report at 45-47.

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[82] Petition, Proposal Two at 7-8; Neels Report at 35-36. Neels presents his econometric analysis in Library Reference UPS-RM2016-2-LR-NP1.

[83] Neels Report at 33. Neels notes that two reports calculate the Postal Service's fixed costs and discuss how these fixed costs seem to change over time. *Id.* at 32. *See generally* McBride Paper; Robert Cohen and John Waller, *The Postal Service Variability Ratio and Some Implications*, September 30, 2014 (Cohen/Waller Report) (available at: *http://www.prc.gov/sites/default/files/reports/CohenWaller%20Final%20Report%201-100714.pdf*).

[84] Neels Report at 45-46. In his reply comments, Neels urges the Commission to adopt his findings in 27 cost components. Neels Reply Comments at 41-42.

2. Effect on Cost Attribution

UPS suggests that for the cost components where Neels has found hidden variable costs, as an intermediate step, the Commission and the Postal Service should attribute these costs to individual products "based on their respective shares of overall attributable costs in the preceding fiscal year." Petition, Proposal Two at 10 (quoting Neels Report at 46). UPS argues that this "short-term measure" should be used unless and until "the Postal Service is able to develop better costing models." *Id.* at 10-11. Table V-1 illustrates the impact of Proposal Two as calculated by Neels for FY 2014.

Table V-1

Proposal Two Cost Impacts ($ Millions)

		Initial Proposal Two[85]			**Updated Proposal Two[86]**		
Mail Classes	Attributable Costs under Current Methodology[87]	"Hidden" Variable Costs	Attributable Costs under Proposal Two	% of Current Costs	"Hidden" Variable Costs	Attributable Costs under Proposal Two	% of Current Costs
Market Dominant	28,205	2,649	30,854	109%	1,072	29,277	104%
Competitive	10,970	725	11,695	107%	388	11,358	104%
Total	39,175	3,374	42,549	109%	1,460	40,635	104%

[85] Neels Report at 50.

[86] Neels Reply Comments at 43.

[87] Neels Report at 50.

B. Summary of Initial and Reply Comments

1. Hidden Variable Costs

a. Methodological Assumptions

Commenters criticize methodological assumptions that Neels relies upon in his analysis of Postal Service's costs. Specifically, commenters question Neels's reliance on McBride's classification of the CRA cost components and Neels's treatment of the Postal Service as a single-product firm.

(1) Reliance on McBride's Analysis of Cost Components

Commenters criticize Neels's analysis because it utilizes a previous analysis conducted by McBride that relies on McBride's own classification of costs, which has not been critically reviewed and for which he expressed reservations. Postal Service Comments at 29; Bradley Comments at 39-40. As Bradley points out, McBride's analysis includes "a classification of costs made by neither the Postal Service nor the [Commission]." Bradley Comments at 39. Additionally, Bradley states that McBride's analysis of cost components has never been critically reviewed and, as a result, Bradley argues that McBride may have misclassified cost components as fixed. *Id.* at 40. Furthermore, the Public Representative notes that McBride expressed serious reservations regarding his classification of cost components. PR Comments at 42 (citing McBride Paper at 8, 10). The Public Representative specifically cites and highlights McBride's concerns about the lack of a consistent approach and documentation regarding the criteria the Postal Service uses to determine whether a cost component should be designated as a constant elasticity component. *Id*. (citing McBride Paper at 8).

In his reply comments, Neels argues that McBride's analysis relied "on Postal Service cost component classification assumptions" established in Docket No. R2006-1.

Neels Reply Comments at 18. However, Neels notes that McBride made "a number of simplifying assumptions" due to "the lack of a consistent approach as well as documentation." *Id.* (quoting McBride Paper at 8).

(2) Treatment of the Postal Service as a Single-Product Firm

Commenters also criticize Neels's methodology for failing to recognize that in multi-product firms, such as the Postal Service, both fixed and variable costs can be common and thus not caused by any individual product. Postal Service Comments at 27; Bradley Comments at 41. Similarly, the Postal Service and Bradley comment that institutional costs may be a mix of fixed and variable costs. Postal Service Comments at 34; Bradley Comments at 43. For example, Bradley asserts that Neels misclassifies the two largest components, in terms of costs, as hidden variable costs. Bradley Comments at 40-42. He concludes that while Neels attempts to attribute these costs to individual products, these costs are actually common costs that are not caused by any individual product. *Id.* at 42.

In his response to Bradley's criticism regarding common costs, Neels notes that many of the components in which he found hidden variable costs involve administrative or overhead costs. Neels Reply Comments at 26. Neels observes that the "rate at which overhead costs increase is generally related to increases in the overall size of a firm," and therefore increases in overhead costs can be tied to additional output of products resulting from "increases in the size of a firm." *Id.* at 26-27. Neels asserts that although "[m]easuring such relationships requires data, effort and care…[there is] no reason to distinguish these patterns of cost causation from those observed in mail processing, highway transportation, or other more 'direct' activities." *Id.* at 27.

The Public Representative observes that Neels's models attempt to determine fixed costs "by relying upon the treatment of attributable costs developed from the Postal Service's Annual Ledger of Accounts." PR Comments at 36. The Public

Representative argues that many of the attributable costs may be considered to be "short-run fixed costs, joint costs, or common costs." *Id.* The Public Representative states that Neels does not attempt to distinguish between any of these costs and simply defines fixed costs as costs remaining after deducting inframarginal costs from institutional costs. *Id.* at 38. Therefore, the Public Representative notes that for all cost components that have attributable costs, UPS and Neels fail to recognize short-run fixed costs, joint costs, or common costs, which these cost components may actually contain. *Id.* at 38.

Additionally, Bradley and the Postal Service also note that Neels's methodology "does not apply consistent product definitions across all fiscal years." Bradley Comments at 44; *see* Postal Service Comments at 30. Bradley provides an example of Parcel Select and points out that due to the product's recent reclassification, its weighted volume estimates in earlier years do not measure the same workload as the estimated volume in FY 2014. Bradley Comments at 44. Bradley notes that inconsistent product definitions may also lead to zero volume entries for various products, such as Standard Post. *Id.* While Neels's workload estimates for FY 2007 to FY 2012 have zero values for Standard Post, Bradley states that the volumes were not zero but "existed during that [timeframe] as part of the Parcel Post single-piece and Parcel Post CRA product lines." *Id.*

Neels points out that the Neels Report addressed the issue of change in product definitions over time. Neels Reply Comments at 35 (citing Neels Report at 34-35). Neels also argues that while changes in product definitions may "have altered to some degree the meaning of the published volume count data[,] there is no evidence that any such measurement error is material, that it introduces a systematic bias, or that correcting it would alter the results" of his analysis in any way. *Id.* at 35 (internal citation omitted).

Bradley asserts that "producing a single measure of output for a multi[-]product firm necessarily requires 'mixing apples and oranges.'" Bradley Comments at 43. Bradley states that the resulting measure of aggregate output could lead to a misleading measurement. *Id.* In response, Neels argues that in the absence of evidence that the weighted volumes measures he selected for the regression analysis are biased, the "statistical significance of the results attests to the appropriateness" of their use. Neels Reply Comments at 35-36.

b. Calculating Hidden Variable Costs

(1) Enterprise-Level Analysis

Several commenters highlight numerous shortcomings in Neels's enterprise-level econometric analysis. These shortcomings include the use of a single explanatory variable, reliance on a small time-series dataset, and the limited scope of the analysis.

(a) Single Explanatory Variable and No Control Variables for Other Changes in Costs

Many commenters assert that Neels's regression models are weak because they include a single explanatory variable, weighted mail volume, and do not allow for the possibility that other causes might have been responsible for all or part of the reported changes.[88] The Postal Service and Bradley assert that Neels's model incorrectly assumes that fixed costs do not change over time. Postal Service Comments at 28; Bradley Comments at 42-43. Glick explains that the Postal Service's costing

[88] ACMA Comments at 43-44; Amazon Comments at 105-108; Bradley Comments at 45; Market Dominant Mailers Comments at 13-14; Postal Service Comments at 30; PR Comments at 38-39; Thompson Comments at 8.

methodology recognizes that costs change over time due to a variety of factors other than changes in mail volume.[89]

Amazon and Thompson also state that fixed costs may vary with factors other than the level of output. Amazon Comments at 108; Thompson Comments at 16. Amazon concludes that without additional explanatory variables to control for possible alternative causes, Neels's models cannot prove that a causal relationship exists between mail volume and costs. Amazon Comments at 105 (citing Thompson Comments at 8). Amazon cites a Commission order in which the Commission rejected the results of a Postal Service regression study because the study failed to include an explanatory variable that could separate the effects of the recession on mail volume from the effects of electronic diversion.[90]

Several commenters argue that without control variables included in the model, weighted volume will capture changes in fixed costs that are not due to changes in volumes. PR Comments at 38-39; Bradley Comments at 45; Thompson Comments at 10, 11-13. In their comments, commenters provide a list of factors that Neels could have accounted for in his regressions. Such factors include, but are not limited to, restructuring during the 2007-2009 period of recession; input prices and productivity changes; technological innovations; electronic diversion; competition; statutory and regulatory changes; management changes; cost methodology changes and accounting

[89] Glick Comments at 2. Glick lists three such factors, including "the effect of non-volume workload, cost reduction/other programs, and work year mix adjustments." *Id*.; *see* Docket No. R2013-11, Statement of Stephen J. Nickerson on Behalf of the United States Postal Service, September 26, 2013, at 17 (originally captioned as Docket No. R2010-4R but re-designated by the Commission as Docket No. R2013-11; *see* Docket No. R2013-11, Order No. 1847, Notice and Order Concerning Exigent Request, September 30, 2013, at 3.). "Work year mix adjustments" are changes in the mix of employees and overtime uses.

[90] Amazon Comments at 107 (citing Docket No. R2013-11, Order Granting Exigent Price Increase, December 24, 2013, at 64-69 (Order No. 1926)).

adjustments; deferred maintenance and investments; and differential labor contracts.[91] ACMA states that while Neels acknowledges some "cost cutting initiatives and productivity improvements," he writes them off as unable to "account for the increases in fixed cost that have occurred." ACMA Comments at 41 (citing Neels Report at 39). Thompson asserts that explicit identification of confounding effects is possible but requires "careful examination of the [Postal Service's] underlying activities and decisions…to identify relevant cost drivers." Thompson Comments at 13. Thompson observes, however, that Neels does not attempt to undertake any of those steps. *Id.* Bradley asserts that the most likely reason why Neels's model includes only one independent variable is to avoid "disqualifying multicollinearity." Bradley Comments at 45. Bradley argues that to control for changes over time, Neels should have included time trends or period-specific dummy variables in his analysis. *Id.*

In his reply comments, Neels characterizes the criticisms against his regressions for having a single explanatory variable as vague and impossible to refute. Neels Reply Comments at 2, 32. He asserts that any econometric exercise could be accused of failing to account "for important but nonspecific [omitted] variable[] bias," and "the critic must offer some specific suggestions regarding just what it is that he thinks might have been omitted." *Id.* at 32.

Neels also addresses some of the specific factors that commenters argued he could have accounted for in his regression models. First, Neels argues that he did account for changes in input prices. *Id.* (citing Neels Report at 32). He states that he ran robustness checks based on alternative methods of accounting for input price changes, and these checks confirmed that his regression results are "not sensitive to how one adjusts for changes in input prices." *Id.* Neels maintains that he accounts for

[91] Amazon Comments at 105-106; Bradley Comments at 45-46; Market Dominant Mailers Comments at 13-14; Postal Service Comments at 30; PR Comments at 38; Thompson Comments at 8; Glick Comments at 6-14.

input price changes in labor costs in one robustness check, and the results disprove Thompson's suggestion that different labor contracts could affect costs. *Id.* at 32-33.

Second, Neels dismisses Bradley's concern that changes in technology and management adjustments might be among variables omitted from his regression models. *Id.* at 32 (citing Bradley Comments at 45). He states that technology changes occur continuously, and the impact of these changes would vary by cost component depending on the nature of the change. *Id.* at 33. Neels asserts that he found a "broad tendency across many different components for fixed costs to decline with declines in volume." *Id.* He comments that "[m]anagement adjustments" are ultimately "volume[-]related reductions in cost," which is what he sought to measure in his regression analysis. *Id.*

Third, in response to criticisms that his regression models omitted the potential impact of the Great Recession of 2007-2009, Neels states that the significant effect of the Great Recession was the decrease in mail volumes, which is the effect he accounts for in his analysis. *Id.*

(b) Small Dataset

Multiple commenters criticize Neels's regressions for having a small sample of eight data points. The Postal Service and Bradley assert that having such a small dataset by itself is enough to disqualify Proposal Two and reject Neels's regression analysis. Postal Service Comments at 27-28; Bradley Comments at 45. Consequently, the Postal Service and Bradley characterize Neels's regressions as "fragile," being "subject to influential observation problems," having "low statistical power," and suffering from "fitting the (thin) sample data rather than estimating a true population regression line." Postal Service Comments at 30; Bradley Comments at 45.

Thompson and Amazon also state that a dataset of eight observations is insufficient to allow reasonable statistical inference. Thompson Comments at 16;

Amazon Comments at 108. Thompson further clarifies that without making very strong assumptions, it is not possible to calculate measures of statistical significance or reliability from such a small dataset. Thompson Comments at 16. Similarly, the Market Dominant Mailers comment that "[r]egression results based on such tiny [datasets] are certainly too unreliable to take seriously." Market Dominant Mailers Comments at 14.

In his reply comments, Neels disagrees with the criticisms that "no analysis based on a sample of just eight observations can possibly be reliable." Neels Reply Comments at 29. Neels states that "[s]tatistical analysis based on the application of simple techniques to datasets that by today's standards are extremely small has often been used in seminal economic research." *Id.* Neels emphasizes that in small samples "a stronger statistical signal is needed in order to draw firm conclusions." *Id.* As "accurate guidance on exactly how strong that signal has to be" for different sample sizes, he provides a textbook table with critical values from the *t* distribution. *Id.* at 29-30. Neels emphasizes that the performed hypothesis tests indicate that the results are statistically significant in 37 out of 84 regressions and, therefore, Bradley's concern that a regression based on only eight observations "suffer[s] from low statistical power" should be dismissed. *Id.* at 36. Neels adds that if his regression models did suffer from low statistical power, he would have found hidden variable costs in a greater number of cost components. *Id.*

Neels agrees that "more data are always better than less" and discusses the possibilities he explored to expand the sample size. *Id.* at 31. First, Neels observes that use of quarterly data (instead of annual data) would add "little useful additional information" for the analysis. *Id.* Such data, he states, would vary seasonally, while overhead costs would adjust relatively slowly. *Id.* Second, Neels argues that extending the sample backwards would include pre-PAEA data. Prior to the PAEA, the Postal Service operated under a different regulatory regime, and with the transition to the PAEA there were significant changes in some of the Postal Service's cost and volume

reports. These changes make it difficult to assemble a consistent time series. *Id.* Neels concludes that his regression analysis is "necessarily limited by the amount of data available" and maintains that the derived results are highly statistically significant even though a "higher threshold[] [was] required to achieve significance in the relatively small samples." *Id.* at 24, 31.

Neels argues that if his regressions were as "fragile and unreliable" as his critics allege, one would expect his results to be "all over the map" and highly sensitive to change in the inputs used in his regression models. *Id.* at 28. Instead, Neels asserts that for many cost components he found that fixed costs varied with mail volume and that his models were not sensitive to changes in the inputs. *Id.*

(c) Limited Scope of the Analysis

Several commenters state that Neels's analysis is one-sided because he does not attempt to identify hidden fixed costs in costs that are currently classified as either attributable or volume-variable. Amazon Comments at 113; Thompson Comments at 9, 25-26; Market Dominant Mailers Comments at 14. Amazon and Thompson assert that a complete analysis would also include an examination of whether costs currently classified as volume-variable contain any hidden fixed costs. Amazon Comments at 113; Thompson Comments at 9. After applying Neels's methodology to the total attributable costs and performing his own calculations, Thompson finds that the amount of so-called hidden fixed costs among volume-variable costs could be as much as twice the amount of hidden variable costs among fixed costs identified by Neels. Thompson Comments at 25. Both Amazon and Thompson, however, emphasize that none of these results are reliable. Amazon Comments at 21; Thompson Comments at 26. Thompson further states that applying Neels's methods to all of the costing and volume data, "would lead to a conclusion that Postal Service costing procedures are biased towards finding too much variability [in] costs caused by volume changes, rather than too little." Thompson Comments at 26.

(2) Component-Level Analysis

In addition to their criticisms of Neels's enterprise-level regression analysis, several commenters highlight shortcomings in Neels's component-level analysis. For example, commenters express concerns with Neels's treatment of conceptually implausible component-level results and his failure to evaluate the data and the models using standard econometric tests.

(a) Criticisms of Neels's Approach

Commenters assert that many of Neels's regressions produce anomalous or implausible results. Thompson Comments at 9; Amazon Comments at 20-21; PR Comments at 41. For example, Thompson notes that 31 of the 37 regressions (that Neels interprets as revealing hidden variable costs) predict negative fixed costs, which Neels interprets as "not conceptually plausible." Thompson Comments at 8 (citing Neels Report at 44).

Several commenters express their concerns that Neels selectively uses his regression results. Specifically, Thompson asserts that Neels arbitrarily replaces the regressions that produce implausible results with alternative regressions lacking a constant term, "forcing the result that these cost components have no 'truly' fixed costs." *Id.*

Similarly, the Public Representative states that he analyzed cost components that were estimated to have negative intercepts statistically different from zero. PR Comments at 41. The Public Representative examined the attributable costs of these cost components and found that none of these components actually had attributable costs. *Id.* The Public Representative asserts that "[i]t is safe to conclude that the component[-]level regressions do not produce meaningful component-level results." *Id.*

After excluding 37 regressions that Neels interpreted as revealing hidden variable costs, Amazon and Thompson state that 17 of the remaining 47 component-

level regressions have a negative slope coefficient. Amazon Comments at 109; Thompson Comments at 8-9. Amazon and Thompson note that UPS reported that 8 of these 17 regressions are statistically significant and that 11 of the 17 regressions are "strongly negative." Amazon Comments at 109; Thompson Comments at 9 (citing Neels Report at 38-39). While Neels discounts these anomalous results as "statistical noise," Amazon and Thompson assert that the cause of these counterintuitive results appear to be more than random error. Amazon Comments at 109; Thompson Comments at 9; *see* Neels Report at 43 n.59.

Amazon states that while "[a] proper analysis would consider the possibility that these counterintuitive but statistically significant results reflect some underlying flaw in his methodology[,]" Neels instead adopts *ad hoc* rules to suppress inconvenient results. Amazon Comments at 110; *see* Thompson Comments at 24. Thompson adds that Neels's adjustments to his results, discarding some and replacing others with alternatives that presume the presence of hidden variable costs, ignore the possibility that unexpected results are due to confounding effects or other problems that he did not consider. Thompson Comments at 24. Amazon opines that the "extensive discarding of results that [do] not support the Proposal Two hypothesis warrants the inference that the regression results are based not on reliable evidence, but on 'confirmation bias.'" Amazon Comments at 111 (citing Thompson Comments at 24-25); *see* Thompson Comments at 24-25.

In his reply comments, Neels maintains that the component-level fixed cost regressions provide highly robust results, which are not sensitive to slight changes. *See* Neels Reply Comments at 28. Neels states that he conducted additional robustness tests by replacing weighted volumes measures with alternative measures of volume. *Id.* He also notes that in his report, he tested the sensitivity of his regression models by using several methods to adjust costs for inflation and found that the obtained results

were qualitatively similar.[92] Neels also estimates fixed cost regressions at the cost segment level where he obtains 4 statistically significant positive coefficients in 15 regressions he is able to run.[93] Neels observes that this proportion is similar to the proportion of statistically significant positive coefficients he found in his component-level regressions, and he therefore concludes that hidden variable costs estimated from fixed cost regressions are "economically significant." Neels Reply Comments at 29.

(b) Specific Component-Level Analysis Comments

In his initial comments, Glick presents an illustrative list of non-volume factors that he believes affect component-level reported fixed costs over time. Glick Comments at 3-14. For example, Glick states that declines in Cost Component 169 (Building Project Expenses) are not evidence of hidden variable costs. *Id.* at 6. Glick notes that the rate of aging and deterioration of Postal Service facilities and the need for facility repairs have not declined but, rather, the associated costs have been deferred. *Id*. Neels disagrees with Glick's characterization that such costs are deferred. Neels Reply Comments at 33-34. Neels states that without evidence that the deferred costs reappear in the budget in the following year or years, the Commission should not accept that these costs have been deferred. *Id*.

Glick also states that mail volume did not cause the downward trend in the percentage of employees covered by the Civil Service Retirement System (CSRS). Glick Comments at 8. Glick asserts that this decline would have occurred regardless because the CSRS was replaced by the Federal Employees Retirement System for

[92] Neels Reply Comments at 28-29; *see* UPS-RM2016-2-LR-NP1, folder "2 - Fixed Costs Regressions," workbooks "Inflation Sensitivity" and "Inflation Sensitivity Reg Results."

[93] Neels Reply Comments at 29. Neels did not run regressions for three cost segments. Neels's segment-level regression results and relevant robustness tests are located in Library Reference UPS-RM2016-2/LR-NP2, March 25, 2016, folder "3 - Proposal Two Updates," workbooks "Robustness Check_Tables" and "Robustness Check_Segment Level Regressions."

federal employees who entered service on and after January 1, 1987. *Id*. Glick states that Neels's hidden variable cost adjustment for Cost Component 202 (Annuitant Health Benefits - Earned (Current)) would produce anomalous results. *Id*. at 9. Glick notes that UPS and Neels both state that the current 45-percent-fixed and 55-percent-variable split is more plausible than the 96-percent-fixed and 4-percent-variable split in Neels's models. *Id*. at 10. In his reply comments, Neels asserts that while his initial regression models did not consider the decreasing ratio of CSRS pension costs of Cost Component 202, this factor does not affect his finding that there was "a positive and significant relationship to volume in [some] Component 202 fixed costs." Neels Reply Comments at 34. After removing CSRS pension costs, Neels states that his modified regression models imply a smaller amount of hidden variable costs, but the results still show a positive and significant relationship between volume and fixed costs. *Id*.

Glick argues that while Neels identifies $208 million of allegedly hidden variable costs for Cost Component 70 (Rural Carrier – Other Routes), he fails to control for other factors. Glick Comments at 12. Glick notes that rural routes are classified into two categories, evaluated routes and other routes, and suggests that changes in the composition of rural carrier costs between the two groups could be a non-volume factor that influences costs for Cost Component 70. *See id*. Glick suggests that to ensure a comparison unaffected by the shift of costs from other routes to evaluated routes, these categories should be analyzed together, rather than as individual components. *Id*. at 14. Following these suggestions, Thompson reruns Neels's regression model for the combined Cost Components 70 (Rural Carrier - Other Routes) and 69 (Rural Carrier - Evaluated Routes). Thompson Comments at 13. The resulting regression has a negative slope coefficient which indicates, per Neels's methodology, that these components do not have hidden variable costs. *Id*. In his reply comments, Neels agrees that Glick's and Thompson's arguments are reasonable. Neels Reply Comments at 34-35. Neels confirms that there is no evidence of hidden variable costs for Cost Component 70. *Id*. at 34-35, 41.

Glick anticipates that an in-depth analysis of all 84 cost components modeled by Neels would uncover many other non-volume factors that explain Neels's regression model results. Glick Comments at 4. Neels, however, replies that Glick "offers no evidence to support this speculation." Neels Reply Comments at 35 (citing Glick Comments at 4).

(3) Testing Data and Regression Models

The Postal Service and Bradley assert that Neels does not apply any of the standard econometric tests and does not examine his methodologies for influential observations, autocorrelation, or stability. Postal Service Comments at 30; Bradley Comments at 46. For example, after creating a cross-plot of Neels's fixed cost measures and his weighted volumes measures, Bradley concludes that FY 2007 is an outlier and FY 2008 may be atypical. Bradley Comments at 46. Bradley asserts that the existence of outliers is a particularly critical issue for such small datasets where even one overly influential observation could skew the estimation and provide a spurious regression result. *Id*. To test for overly influential variables, Bradley excludes the FY 2007 observation from the analysis, re-estimates the regression, and finds that there is no relationship between fixed cost and volume. *Id*. at 47. Bradley asserts that he also confirmed the lack of relationship between Neels's fixed cost and volume by re-estimating the model with additional dummy variables for FY 2007 and FY 2008. *Id*. at 48.

In its comments, Amazon states when the FY 2007 and FY 2008 observations are excluded, the regression has a negative slope coefficient—a result that Neels concedes is implausible. Amazon Comments at 111; *see* Neels Report at 43. Additionally, Amazon states that excluding the FY 2007 and FY 2008 data increases Neels's estimated fixed costs to $13.29 billion, which exceeds the total reported fixed cost in every year except FY 2014. *Id.* at 111-12; Thompson Comments at 19. Amazon states that Neels's methodology would not have produced statistically significant results

without the presence of "the two oldest and least representative data points in the regression." *Id*. at 112.

Amazon and Thompson also assert that Neels did not investigate the possibility that the negative constant terms were symptoms of statistical error, data errors, or misspecifications in the functional forms of his models, which could also taint the results of the regressions with both positive constant terms and positive slopes. Amazon Comments at 109; *see* Thompson Comments at 24.

Bradley suggests that Neels could have applied his regression analyses to market dominant and competitive products separately. Bradley Comments at 49-50. After performing this task himself, Bradley states that although his results "are just as spurious as [Neels's] original results, they do appear to suggest that if any volumes are 'causing' these fixed costs, it would be the market dominant volumes." *Id.* at 50.

Neels argues that Bradley's attempt to re-estimate the model by running separate regressions for market dominant and competitive products is a "deliberate mis-specification of the model." Neels Reply Comments at 38. Neels asserts that there is no conceptual justification for Bradley's regressions because they "omit known, important[,] and readily measurable [cost drivers]." *Id.* Neels maintains that such an attempt introduces bias, which "could alternatively be considered omitted variable bias" since each of Bradley's regressions "omits one of two key measures of volume." *Id.* at 38 n.84.

Thompson notes that Neels does not report statistical confidence intervals for the hidden variable costs that he identified. Thompson Comments at 20. Thompson, however, claims that these regression models indicate that their results are subject to a high level of statistical uncertainty. *Id.* Thompson specifically states that because Neels's regression analysis contains only eight data points, "it is impossible to calculate measures of statistical significance or other measures of statistical reliability…without making very strong assumptions." *Id.* at 16. Neels responds that for his component-

level regressions, he conducted additional robustness tests and the concerns Thompson identifies do not affect his results. Neels Reply Comments at 37. These tests include the Royston test for normality and the Newey-West test for heteroskedasticity and autocorrelation of the residuals.[94] Neels concludes that the performed tests rely on "the best available statistical methods" and indicate that Thompson's concerns "do not materially affect" his results. Neels Reply Comments at 37.

Additionally, Neels argues that commenters do not provide sufficient justification for eliminating the observations for FY 2007 and FY 2008 as outliers. *Id.* at 39-40. Neels points out that Bradley has not presented enough evidence to conclude that these data points "are drawn from a different population than the reminder of the sample," which, according to Neels, is a criterion for such data to be outliers. *Id.* at 40. Neels states that the mere fact that a data point is different from others does not mean that the data point should be removed. *Id.*

Neels also rejects Bradley's suggestion to include a time trend in a regression model. *Id.* at 38. Neels maintains that "there is no conceptual justification" for such inclusion "except to serve as a proxy for some otherwise omitted variable…." *Id.* Neels argues that "it is hard to see what other omitted variable [the time trend suggested by Bradley] might proxy for" because of its high correlation with the weighted volume used in Neels's regression model. *Id*.

2. Allocating Hidden Variable Costs

The Market Dominant Mailers assert that Proposal Two violates the statutory causation requirement and that Neels's models are unsupported. Market Dominant

[94] *Id.* at 37 nn.82-83; *see* UPS-RM2016-2/LR-NP2, folder "3 - Proposal Two Updates," workbooks "Robustness Check Tables" and "Robustness Check_Newey West."

Mailers Comments at 13. Similarly, the Postal Service and Bradley assert that Neels's method of distributing hidden variable costs is arbitrary and has no basis in postal operations, economic theory, or econometric practice. Postal Service Comments at 27, 32; *see generally* Bradley Comments at 39-57. The Postal Service argues that the established methodology of cost distribution requires the identification of the proportion of the cost drivers by each product and then the use of that proportion to distribute the costs to products. Postal Service Comments at 31-32. The Postal Service states that because Neels did not identify any cost drivers for the components he investigated, he could not apply the established methodology of cost distribution. *Id.* Rather, as the Postal Service and Bradley note, Neels allocates the costs to products based upon each product's share of attributable costs in the previous year. *Id.*; Bradley Comments at 55. Bradley argues that if the cost components were indeed volume-variable, their distribution should be based upon the volumes that actually caused them. Bradley Comments at 55. Bradley comments that Neels does not offer any justification why this methodology should override detailed variability analyses that have been reviewed and approved by the Commission. *Id.* at 56.

Responding to Bradley's criticism, Neels states that he recommends attributing hidden variable costs "based on their respective shares of overall attributable costs in the *same* fiscal year, and not...in the ***preceding*** year[,]" a distinction he states is clearly presented in the worksheets that accompany Proposal Two. Neels Reply Comments at 39 (emphasis in original).

The Postal Service and Bradley assert that although Neels's regression models provide variabilities for the hidden variable costs, Neels "ignores those variabilities when distributing institutional costs to products." Bradley Comments at 56; Postal Service Comments at 31-32.

3. Possible Further Examination of Costs

NPPC asserts that the Commission should consider whether costs that are currently classified as fixed are truly fixed and whether the volume variability of cost components can be measured more accurately. NPPC Comments at 8. NPPC states that if the Commission finds that there are sufficient grounds to revisit the Postal Service's classification of the particular costs, "the appropriate course would be to proceed to review and...improve the costing methodology." *Id*.

Similarly, the Public Representative states that although Neels's analysis does not result in any reliable estimates of the hidden variable costs among fixed costs, it is likely that some variable costs are currently classified as fixed. PR Comments at 42-43. The Public Representative recommends that to address the concerns expressed in Proposal Two, the Commission should initiate a subsequent rulemaking docket to examine the classification of individual cost components and assignment of costs to them. *Id.* at 42-43, 54. The Public Representative states that a rulemaking proceeding could provide an opportunity for the Commission to review the assumptions that the Postal Service relies on to distinguish between fixed and variable costs for each cost component. *Id.* The Public Representative comments that in a new rulemaking docket the Commission could consider the appropriateness of new methods of allocating short-run fixed, joint, and common costs, as well as examine the manner in which these costs should be distributed to products within each component. *Id.* at 54.

In its reply comments, Amazon asserts that the Public Representative's suggestion for further study of the variability of individual cost components would be more useful than further consideration of Neels's models. Amazon Reply Comments at 24. Amazon adds that any further study should allow for the possibility that existing variabilities are either understated or overstated. *Id.*

C. Commission Analysis

1. Defining Hidden Variable Costs

UPS asserts that "the Postal Service has a *systematic tendency* to misclassify costs as fixed, rather than variable." Petition at 10 (emphasis in original). UPS and Neels maintain that a significant portion of institutional costs are variable costs, but the Postal Service treats them as fixed. Petition at 9-10; *id.* Proposal Two at 3, 8-10; Neels Report at 32, 39-40; UPS Reply Comments at 43-45. UPS and Neels characterize such costs as hidden variable costs. Petition, Proposal Two at 10-11; Neels Report at 37-40; Neels Reply Comments at 2, 29-31.

The Postal Service currently defines institutional costs as "the difference between total accrued costs and total attributable costs," where attributable costs include volume-variable and product-specific costs.[95] For CRA cost components that do not have any attributable costs, all costs currently represent institutional costs, such as costs in Network Travel component group of Cost Segment 7, costs in Contract Stations component group of Cost Segment 13, and costs in Supply Personnel component group of Cost Segment 16. For cost components that include a portion of volume-variable costs, institutional costs are residual costs that remain after attributable costs are subtracted from accrued costs. FY 2015 Summary Description of Costs, Preface at ii.

Textbooks define "fixed cost" as the amount of cost that "goes on independently of output," "even when a zero output is produced"[96] and observe that "fixed costs remain the same…regardless of the level of production."[97] Similarly, the Postal Service refers to fixed costs as costs that "would remain if the Postal Service handled no volume."

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[95] *See* FY 2015 Summary Description of Costs, "PREF-15.docx," at ii (Preface).

[96] Paul A. Samuelson, *Economics* 466-467 (10th ed. 1976).

[97] David C. Colander, *Microeconomics* 209 (5th ed. 2004).

Postal Service Response to CHIR No. 2, question 4. However, despite being straightforward in theory, the Postal Service argues that "fixed costs can be difficult to identify in practice." *Id.* The Postal Service states that its methodology for calculating product costs "does not require identification of fixed costs." *Id.* As the Postal Service explains, when calculating marginal and incremental costs, instead of identifying costs at the zero level of production (the textbook definition of fixed costs), it identifies the "costs [that]…vary with volume *at current levels of volume,* along with those costs that do not." *Id.* (emphasis added). Consequently, the Postal Service disagrees with UPS's and Neels's characterization that the Postal Service treats the majority of institutional costs as fixed. Postal Service Comments at 27-29. The Postal Service also confirms that institutional costs are a mix of fixed and variable costs. Postal Service Response to CHIR No. 2, question 4

Bradley states that it is not of critical importance for the Postal Service to identify "whether a particular cost is 'fixed' or 'variable' in a textbook sense" but, rather, to identify "if, and by how much, a cost changes as the level of output changes, under current operations." Bradley Comments at 5. While discussing its current methodology to identify the cost pools (component groups) with zero variability, the Postal Service also emphasizes that these cost pools include costs that "are not purely 'fixed' costs in the textbook sense" but "are fixed with respect to changes in volume." Postal Service Response to CHIR No. 2, question 4.

When defining fixed costs, Neels emphasizes that these costs do not vary by volume and are not associated with a particular product. Neels Report at 9. The Postal Service, however, states that institutional costs may be a "mixture of textbook variable and textbook fixed costs," and the most important quality of institutional costs is that they "are *not caused by individual products.*" Postal Service Comments at 34 (emphasis added). Accordingly, while the Postal Service's institutional costs could include variable costs, these variable costs are not attributable to a specific product.

Because the Postal Service is not legally required to identify or report fixed costs, the Commission need not confirm whether the Postal Service treats any portion of its institutional costs as fixed.

In Proposal Two, UPS provides its own methodology for calculating fixed costs. It defines fixed costs (or reported fixed costs) as the difference between institutional costs (reported by the Postal Service) and inframarginal costs (identified in Proposal One by UPS). Petition, Proposal Two at 7. In Proposal Two, UPS provides Neels's econometric models to support its identification of hidden variable costs. *Id.* at 7-10. Before the hidden variable costs identified in Proposal Two can be attributed to specific products, the Commission must determine whether UPS successfully demonstrates that these costs are reliably identifiable and causally related to individual mail products. *See* 39 U.S.C. §§ 3622(c)(2), 3631(b). As discussed below in sections V.C.2 and V.C.3, Proposal Two does not reliably identify a causal relationship between hidden variable costs and products pursuant to section 3622(c)(2) and therefore cannot represent an improvement over the current methodology as required by section 3652(e)(2). Accordingly, the Commission does not adopt Proposal Two.

2. Calculating Hidden Variable Costs

a. Econometric Methodology and Enterprise-Level Analysis

Neels performs regression analyses to econometrically identify hidden variable costs among overall fixed costs and then within CRA cost components. Neels Report at 31-48. In the regression analyses, Neels applies a linear equation with one explanatory variable. *See id.* at 36, 41. As inputs, Neels uses data for eight annual data points from

the CRA Model Public B worksheets that the Postal Service provides with its Annual Compliance Reports (ACRs) for FY 2007-FY 2014.[98]

For the dependent variable, Neels seeks to identify the costs that, he believes, according to the Postal Service's costing methodology, should not change when mail volume changes and therefore are "supposed to be truly fixed." Neels Report at 31, 32. In his enterprise-level analysis, in a particular fiscal year, Neels estimates truly fixed costs for each of the 18 CRA cost segments and then sums these segment-level costs to calculate the overall truly fixed costs.[99]

Neels's approach to identifying these costs contains a few steps. First, to isolate these costs, Neels subtracts inframarginal costs "that do vary with changes in volume" from the Postal Service's institutional costs. Neels Report at 32. As an input for institutional costs, Neels uses "Other" costs from FY 2007-FY 2014 CRA Public B workpapers published as a library reference with its FY 2007-FY 2014 ACRs.[100] Neels calculates inframarginal costs in Proposal One.[101]

Second, to account for price changes over time, Neels adjusts reported costs for inflation. Neels Report at 31, 33-34. He applies multiple inflation indexes to associated costs within each cost segment. *Id.* at 33-34. These indexes track changes in the costs of various inputs, such as labor, transportation, utilities, equipment, and overhead costs.

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[98] *See* UPS-RM2016-2-LR-NP1, folder "1 - Data Sources."

[99] *See* UPS-RM2016-2-LR-NP1, folder "2 - Fixed Cost Regressions," workbook "Total Volume Fixed Cost Variability;" Neels Report at 32.

[100] *See* UPS-RM2016-2-LR-NP1, folder "2 - Fixed Cost Regressions," workbook "Total Volume Fixed Cost Variability." Neels also excludes costs associated with Cost Segments 18.3.4 (Workers Compensation) and 18.3.6 (Annuitant Health Benefits and Earned CSRS Pensions) from fixed costs because he states that they have "experienced large fluctuations in cost that are unrelated to the Postal Service's [current] operations." Petition, Proposal Two at 7 n.6; Neels Report at 35-36.

[101] *See* Petition, Proposal One at 26. Neels notes that the inframarginal costs he applies to his analysis were previously calculated by McBride, who used data from the same data source. Neels Report at 33, 40.

Id. Neels calculates the total inflation-adjusted fixed costs as the sum of inflation-adjusted fixed costs obtained by each cost segment, with the adjustments noted above.[102] UPS and Neels refer to this measure as inflation-adjusted fixed costs (or "fixed costs" or "[r]eported [f]ixed [c]osts") and use it as the dependent variable in Neels's regression model. Petition, Proposal Two at 7; Neels Report at 31-32, 36-39.

For the explanatory variable, in his enterprise-level analysis, Neels constructs a "work-content-weighted volume" measure as a "summation across all postal products" of the annual volume ("number of [mailpieces]") multiplied by the Postal Service's FY 2014 estimates of its per unit attributable costs. Petition, Proposal Two at 7; Neels Report at 34. Neels maintains that the specific use of the weighted measure of mail volume allows him to address an important reality of "the periodic movement of products from the market dominant to the competitive categories." Neels Report at 34-35.

After performing the regression analysis of overall inflation-adjusted fixed costs on weighted volumes, Neels concludes that "the costs that the Postal Service regards as fixed are not actually fixed," and there are "variable costs hidden within [them]." Neels Report at 37.

The Commission finds that Neels's methodology to isolate truly fixed costs relies on a subjective approach. Specifically, in a particular fiscal year, Neels calculates fixed costs as the difference between the reported institutional and inframarginal costs (calculated by Neels following McBride's methodology in Proposal One). As the Commission indicated in its analysis of Proposal One, Neels's identification and calculation of inframarginal costs relies on McBride's methodology of cost categorization, which is neither accepted by the Postal Service nor approved by the Commission and includes a questionable assumption about constant variability (cost

[102] *See* UPS-RM2016-2-LR-NP1, folder "2 - Fixed Cost Regressions," workbook "Total Volume Fixed Cost Variability."

elasticity). If inframarginal costs were calculated differently, the overall fixed costs Neels uses as the dependent variable would be different as well.

Multiple commenters state that Neels's regression model is oversimplified because it has only one explanatory variable—weighted volumes measure. The model does not include any additional variables that may account for changes in factors other than mail volume and could also affect costs during the analyzed period.[103] The Commission finds that Neels's regression analysis, which includes a sole explanatory variable (weighted mail volume), does not produce reliable results. First, as discussed above in section V.C.1, the fixed costs that UPS and Neels identify might still include a portion of variable costs, and therefore these costs could change over time due to multiple factors different from change in volume. Second, by definition, fixed costs stay the same when the volume of production changes. This does not mean that fixed costs are "fixed with respect to time." *See* Bradley Comments at 43; *see also* Thompson Comments at 15. If costs are compared over time, they are subject to the impact of many factors that either first arise or change in magnitude during the evaluated time period. *See* PR Comments at 38; Bradley Comments at 45; Thompson Comments at 15-16.

Commenters provide a long list of factors that could influence Neels's adjusted fixed costs in the time period analyzed.[104] In his reply comments, Neels agrees that "[o]mitted variable bias is always a potential concern in a regression analysis." Neels Reply Comments at 35. Nevertheless, Neels concludes that the majority of the potentially "omitted variables offered by critics [do not] offer a plausible alternative

[103] ACMA Comments at 44; Amazon Comments at 105; Bradley Comments at 45; Market Dominant Mailers Comments at 13-14; Postal Service Comments at 30; PR Comments at 38; Thompson Comments at 8.

[104] Amazon Comments at 105-106; Bradley Comments at 45; Market Dominant Mailers Comments at 13-14; Postal Service Comments at 30; PR Comments at 38; Thompson Comments at 8; Glick Comments at 5-14.

explanation" for his results. *Id.* For example, Neels argues that although there are some factors (such as management adjustments and the Great Recession) that could affect costs, his volume measure already accounts for them. *Id.* at 33.

In regard to "changes in technology," Neels notes that they "occur all the time" and he therefore did not include a technology factor in his model. *Id.* Accordingly, Neels suggests that changes in mail volumes, and not technology changes, impact the costs that he identifies as fixed in the regression analysis. *Id.*

The Commission cannot determine whether the weighted volumes measure that Neels uses as the sole explanatory variable accurately captures the impact of either the Great Recession or electronic diversion, both of which impacted mail volumes in the analyzed time period. *See* Docket No. R2013-11, Order No. 1926 at 65-66. Bradley asserts that the constructed weighted volumes measure used as the explanatory variable is a result of approximation (using the FY 2014 attributable costs for mail class) and further aggregation (summation by all mail classes). Bradley Comments at 43-44. Several commenters argue that this explanatory variable does not provide a reliable single measure of output for the analyzed period of time. *Id.*; Amazon Comments at 105; PR Comments at 38-39; Thompson Comments at 8, 10. The Commission agrees.

The Commission finds it likely that the multiple factors provided by commenters, including non-volume factors specially analyzed by Glick, might be responsible for the changes in costs during the analyzed time period.[105] As the Commission stated in Order No. 1926, "[i]f the economic theory, specified by the variables in the equation, is incomplete, the estimated parameters will be biased." Docket No. R2013-11, Order No. 1926 at 63 n.55. The Commission concludes that the failure to control for multiple

[105] Neels agrees that a few of non-volume factors suggested by Glick should have an impact on his regression results (and affect hidden variable costs). Neels Reply Comments at 34-35.

factors not captured by the weighted volumes measure is a significant flaw in Neels's regression model.

Several commenters criticize Neels's econometric model because of its reliance on a dataset of only eight annual observations.[106] These commenters argue that such a limited sample size is insufficient to consider regression results reliable. Neels agrees that "more data are always better than less" but maintains that his analysis is "necessarily limited by the amount of data available." Neels Reply Comments at 31. Neels confirms that he explored a possibility to use quarterly data but faced the problem of seasonal variations. *Id*. UPS and Neels explain that there were limitations in the Postal Service's data that resulted in the exclusion of data for the years prior to FY 2007 from the analysis. *Id*.; UPS Response to CHIR No. 1, question 9(a). Neels points out that he excluded all data for the years prior to 2007 since it was a "pre[-]PAEA era, when the Postal Service operated under a markedly different regulatory regime." Neels Reply Comments at 31. UPS and Neels also state that since FY 2008, there have been significant changes in the categorization of mail classes and individual products in the Postal Service's Revenue, Pieces, and Weight (RPW) reports, which would make it difficult to assemble a consistent time series if data for prior years were included. *Id*.; UPS Response to CHIR No. 1, question 9(a).

The Commission finds that the problems identified by UPS and Neels present challenges to developing reliable datasets for regression models, but these problems are well known and can be overcome by using widely accepted and applied methods. For example, the Postal Service's demand forecasting regression models necessarily include specific variables that allow the Postal Service to account for periodic variations

[106] Amazon Comments at 108; Bradley Comments at 45; Market Dominant Mailers Comments at 14; Postal Service Comments at 27-28; Thompson Comments at 16.

(*e.g.,* seasonal fluctuations throughout the fiscal year, election cycles) and mail classification changes.[107]

Neels maintains that despite the limited number of observations, the regression analysis of the total inflation-adjusted fixed costs on the total weighted volume produces results that are highly statistically significant under standard tests. Neels Report at 36; Neels Reply Comments at 24, 36-37. In addition, Neels indicates that "higher thresholds [were] required to achieve significance in the relatively small samples from which these results are derived." Neels Reply Comments at 24. Neels specifically refers to the Student's *t* statistics, which he characterizes as "the workhorse statistical test used in most regression analysis" and provides the tables of critical values for the *t* statistics required for different sample sizes. *Id.* at 29-30.

Thompson asserts that Neels's "calculations of statistical significance" are based on some assumptions "that typically do[] not hold in [the type of] time series data [on which Neels relies]." Thompson Comments at 16. Thompson also notes that if a regression analysis includes large datasets, "these assumptions may be testable." *Id.* In his reply comments, Neels selectively discusses his modeling assumptions and provides his findings for some of them. Neels Reply Comments at 37. For example, Neels states that in his regression equations, he tested whether the residuals (measurement errors) were normally distributed.[108] The regression model must also demonstrate that it relies on independently sampled data. However, because Neels's regression model relies on time series data, this assumption "may be very wrong."[109] In

[107] *See, e.g.,* Narrative Explanation of Econometric Demand Equations for Market Dominant Products as of November, 2015, July 6, 2016, file "FY15.MD.Prod.Demand.Narrative.pdf," at 17-22 (available at: *http://www.prc.gov/docs/96/96556/FY15.MD.Prod.Demand.Narrative.pdf*).

[108] *Id.;* UPS Response to CHIR No. 1, question 9(c). Neels reports that his specially performed tests proved normal distribution of residuals in 80 out of 84 of his component-level regressions. Neels Reply Comments at 37.

[109] John Fox, *Applied Regression Analysis and Generalized Linear Models* 101 (2nd ed. 2008).

accordance with econometric theory, the assumption of independently sampled observations (*e.g.,* obtained from a large population using a simple random sample method) "needs to be justified by the procedures of data collection." *Id.* Additionally, contrary to well-known econometric practices, the analyzed time series dataset not only reflects a very short time period but also includes observations for 2 specific and non-representative years of the Great Recession—FY 2007 and FY 2008. *See* Bradley Comments at 45-46; Thompson Comments at 18.

As Bradley and Thompson illustrate, Neel's regression model appears to be very sensitive to the exclusion of either of these two observations from the analysis. Bradley Comments at 46-48; Thompson Comments at 17-20. The Commission finds that it is possible to apply Student *t*-tests to test regressions that use small sample sizes but only under certain assumptions, including independently sampled observations.[110] However, the Commission concludes that Neels's regression model has not been shown to rely on independently sampled data. Consequently, the Commission finds that the obtained high *t*-values do not provide any reliable proof of statistically significant results. Accordingly, the Commission finds that Neels's enterprise-level econometric analysis is not an adequate diagnostic tool to test for the presence of hidden variable costs.[111]

[110] *See, e.g.,* J.C.F. de Winter, *Using the Student's t-test with Extremely Small Sample Sizes*. Practical Assessment, Research & Evaluation, 1 (2013) (available at: *http://pareonline.net/getvn.asp?v=18&n=10*).

[111] Furthermore, as noted by several commenters, UPS limits its analysis in Proposal Two to whether institutional costs contain any hidden variable costs and does not perform any similar analysis of attributable or inframarginal costs. Market Dominant Mailers Comments at 14; Amazon Comments at 113-114; Thompson Comments at 25-26. UPS identifies a number of reasons why such analysis could be technically complex, time-consuming, and expensive, and lack utility. UPS Response to CHIR No. 1, question 7. Thompson, however, illustrates that if Neels's methodology were applied to the attributable costs, the amount of hidden fixed costs among attributable costs would be twice the amount of hidden variable costs among fixed costs identified by Neels. Thompson Comments at 25-26. This analytical exercise further illustrates the weakness of Neels's conceptual approach and unreliability of the obtained econometric results.

Therefore, it cannot be an improvement over the existing methodology pursuant to section 3652(e)(2).

b. Supplemental Segment-Level Analysis

In his reply comments, Neels supplements his initial analysis and includes segment-level regression analysis as an extra diagnostic exercise. Neels Reply Comments at 28-29. Neels concludes that the segment-level results are "qualitatively similar" to the results of the enterprise-level regression analysis, and the identified hidden variable costs are "economically significant." *Id.* at 29. To develop his segment-level regression model, Neels uses a similar methodology that he used in his enterprise-level analysis but constructs the variables (inflation-adjusted fixed costs and weighted volumes) for the CRA cost segments.[112] For 3 out of 18 cost components, Neels estimated no fixed costs and therefore excluded these cost components from the consideration. *Id.;* Neels Reply Comments at 29. Neels claims that in 4 out of 15 segment-level regressions he obtained statistically significant results. Neels Reply Comments at 29.

The Commission finds that the segment-level regression analysis suffers from the same problems as the enterprise-level analysis (*e.g.,* a single explanatory variable, lack of control variables, limited and non-representative sample size). For 11 cost components, the regression equations provide statistically insignificant coefficients and produce statistically insignificant results. *See id.* Consequently, if accepted, the results of the segment-level analysis would reject the hypothesis about the presence of hidden variable costs in 11 cost segments. The Commission finds that Neels's segment-level econometric analysis does not provide a reliable diagnostic tool to determine the presence of hidden variable costs in cost segments.

[112] *See* UPS-RM2016-2/LR-NP2, folder "3 - Proposal Two Updates," workbook "Robustness Check_Segment Level Regressions."

c. Identifying Hidden Variable Cost in CRA Cost Components

After concluding that there are hidden variable costs within the reported institutional costs, Neels analyzes individual cost components to "determine where current Postal Service costing procedures and parameters do not appropriately separate fixed and variable costs." Neels Report at 40. However, the concerns discussed above regarding Neels's enterprise and cost-segment-level regression models (*e.g.,* single explanatory variable, no control variables, limited sample size) remain valid. The Commission finds that Neels's econometric model does not reliably identify hidden variable costs. Notwithstanding these concerns, the Commission reviews Neels's component-level analysis.

(1) Excluding Cost Components from Consideration

Before beginning the component-level analysis, Neels excludes 86 (or more than half) of 170 CRA cost components that he identifies in the FY 2014 CRA report from consideration. *Id.* at 44. In the Neels Report, Neels provides the following primary reasons for excluding cost components from consideration: the component is new in FY 2014, and there is no historical data for FY 2007-FY 2014; the component's estimated fixed costs are zero at least 1 year during the analyzed time period; or the component's FY 2014 reported institutional costs are negative.[113]

The worksheets that accompany the Neels Report provide additional information regarding the cost components excluded from consideration.[114] As illustrated in Table V-2 below, the vast majority of these cost components have zero estimated fixed costs

[113] *Id.* at 43-44. Neels also excludes cost component Domestic Alaska Air because of some additional costs that, regardless of their variability, were "incurred in providing mail service in Alaska...as part of the Postal Service's universal service obligation [USO]." *Id.* at 44 n.61.

[114] UPS-RM2016-2-LR-NP1, folder "2 - Fixed Cost Regressions," workbook "Component Fixed Cost Regression Results."

in FY 2014. Forty, or slightly more than half, of these cost components also have zero reported institutional costs, while the other thirty-six have positive institutional costs. In Neels's estimation, however, they contain only inframarginal costs.

Table V-2

Non-Modeled Cost Components by Reason for Exclusion

# of Cost Components	Reason for Exclusion from Econometric Analysis
36	Zero reported institutional costs in FY 2014
40	Positive reported institutional costs in FY 2014, but zero estimated fixed costs
6	Negative reported institutional costs in FY 2014
3	No cost data for 1 or more years in the FY 2007-FY 2013 period
1	Incurs costs due to the USO
Total: 86	

Source: UPS-RM2016-2-LR-NP1, folder "2 - Fixed Cost Regressions," workbook "Component Fixed Cost Regression Results."

The Commission finds the methodology used to reject cost components from consideration to be arbitrary because it heavily relies on calculating fixed costs as the difference between the reported institutional and Neels's estimated inframarginal costs. Also, although Neels excludes the cost components with negative institutional costs, he still models the cost component with negative attributable costs (Cost Component 1430).

(2) Component-Level Analysis

Neels's component-level econometric analysis consists of two steps. In the first step, Neels applies a simple linear regression model, which is similar to the one in his enterprise-level analysis, but for each of the 84 cost components. Neels Report at 40-

42. Neels makes a few conclusions based on signs of slope and/or constant coefficients in the component-level regressions and level of statistical significance of the regression results (*see* Table V-3).

Table V-3
Component-Level Regression Initial Results

	Positive Constant	Negative Constant	Total
Positive and Significant Slope	6	31	37
Positive and Insignificant Slope	20	10	30
Negative Slope	17	0	17
Total	43	41	84

Source: Neels Report at 42.

Neels accepts the Postal Service's costing methodology for the 17 cost components where the regression has a negative slope. *Id.* at 43. He clarifies that the obtained negative slope "would imply that adding mail to the system reduces fixed cost," which he finds implausible. *Id.* Neels does not explain why his regression model produced such implausible results but, rather, states that the results are due to "some statistical noise, which can occasionally generate some surprising results." *Id.* at 43 n.59.

Neels concludes that there is "insufficient evidence to reject Postal Service costing procedures" for the 30 component-level regressions with positive, but statistically insignificant, slopes. *Id.* at 43.

For the cost components where regressions produce positive and statistically significant slopes, Neels considers whether the constant (intercept) is positive or negative. For the six cost components where regressions have positive constants, Neels accepts his regression results and concludes that these cost components contain

hidden variable costs.[115] In regards to the remaining 31 cost components, where the regressions have positive and statistically significant slopes but negative constants, Neels states that the negative constant term means that the regression equations could result in negative costs, which is "not conceptually plausible." Neels Report at 44. Accordingly, for these cost components, Neels performs a second round of the regression analysis with the constant at zero. *Id.*

Like his enterprise-level analysis, the Commission finds that Neels's component-level analysis fails to reliably identify hidden variable costs.[116] As multiple commenters acknowledge, Neels's regressions produce anomalous results. *See* Thompson Comments at 9; Amazon Comments at 20; PR Comments at 41. For 17 cost components the regression equations have a negative slope, which means that these components' fixed costs decrease as mail volume increases. *See* Neels Report at 41-43. While Neels attempts to explain the results as "statistical noise," the Commission agrees with Amazon and Thompson that the cause of these counterintuitive results is

[115] In his reply comments, to account for non-independent observations, Neels applied the Newey West estimator, which provided recalculated errors and the new *t*-values. Neels Reply Comments at 37. Neels obtained eight statistically significant component-level regressions with positive slopes, and this is very similar to his original component-level regression results where he obtained six such regressions. *See* UPS-RM2016-2/LR-NP2, folder "3 - Proposal Two Updates," workbook "Robustness Check_Newey West."

[116] The Commission does not accept the regression results for 30 cost components where the regressions have statistically insignificant slopes (and therefore were also rejected by Neels). *See id.* at 42-44. Additionally, from the list of cost components for which the Commission should adopt his results and where the original regressions produced statistically significant and economically acceptable results (six such cost components), Neels later excludes two cost components, Cost Component 70 and Cost Component 202. Neels Reply Comments at 42, Table R-6. Neels excludes Cost Component 70 in response to criticism from Glick and Thompson. *Id.* at 34-35, 41 n.91. Neels *also* excludes Cost Component 202 as a component containing inframarginal costs. *Id.* at 41; *see* UPS-RM2016-2/LR-NP2, folder "3 - Proposal Two Updates," workbook "Reply Component Fixed Cost Regression Results," tabs "Proposal Two Comps in Initial" and "Table R-6."

likely more than random error.[117]

Additionally, as the Public Representative notes, the cost components that result in positive and statistically significant slopes, but negative constants (intercepts) are cost components that do not have any attributable costs. PR Comments at 41. As Neels explains, to develop a measure of weighted mail volume, the explanatory variable, he multiplies the FY 2014 component-level per unit attributable costs by the annual mail volume for each mail class and sums the resulting weighted mail volumes across mail classes. Neels Report at 41. However, if the cost component has no attributable costs, then his methodology would result in zero weighted volumes. To avoid this problem, Neels decides to "use the 2014 per unit *total* attributable cost" instead.[118] In other words, for the cost components where per unit *component-level* attributable cost is zero, Neels applies per unit *total* "attributable cost (summed across all components) for each mail class." Neels Report at 41.

As a result, the regression equations for the cost components that do not have any attributable costs have the same set of total weighted volume values assigned to the explanatory variable, but very different (and broadly ranged) sets of component fixed costs values assigned to the dependent variable. The Commission concludes that the total weighed volume measures for the explanatory variable in these component-level regressions do not reflect the component's actual mail volumes. This methodology appears to be the primary reason for the economically implausible results derived from

[117] *See* Amazon Comments at 109; Thompson Comments at 9; Neels Report at 43 n.59. Amazon and Thompson observe that UPS reported that 8 of the 17 negative slope coefficients are statistically significant. For 11 of the 17, the regressions implied strongly negative variable costs for the associated cost components, a result that Neels believes is implausible. Amazon Comments at 109; Thompson Comments at 9; *see also* UPS Response to CHIR No. 1, question 12, Table 2.

[118] *Id.* (emphasis added). The Public Representative expresses a concern that such approach leads to "a substantial error measuring weighted volumes" for the explanatory variable in each affected regression equation. PR Comments at 41. The Public Representative explains that in the regression model for the cost components with no attributable costs, Neels uses a component-level fixed cost measure as a function of a "much larger portion of company-wide weighted volumes." *Id.*

the regression equations Neels developed for the components with no attributable costs.

While Neels acknowledges that 31 cost components with negative constant terms, but positive and statistically significant slopes, are "not conceptually plausible," as several commenters note, Neels does not attempt to discover any underlying reason for such results. *See id.* at 44; Amazon Comments at 110; Thompson Comments at 8, 24-25. Instead, Neels reruns his linear regression models with the same variables, but without constant terms. Neels Report at 44. Neels concludes that, as modified, the regression results for all 31 cost components have statistically significant slopes and are economically meaningful. *Id.* at 45.

Several commenters assert that Neels selectively uses his regression results and applies *ad hoc* rules to arbitrarily replace the regressions that produce implausible results. Amazon Comments at 110; Bradley Comments at 52; Thompson Comments at 8, 24-25. Specifically, Thompson states that by developing the alternative regression model without a constant term for 31 cost components, Neels forces "the result that these cost components have no 'truly' fixed costs." Thompson Comments at 8.

In all his regression analyses, Neels tests the hypothesis that variable costs exist among fixed cost. However, using a linear regression model without an intercept/constant excludes the very possibility of the existence of fixed costs because if in this model the weighted volumes measure is zero, then the adjusted fixed cost measure is also zero. This means that for these cost components, at zero level of production, there are no costs (or the component's fixed costs are zero). Consequently, any costs incurred by these cost components are assumed to be variable. The Commission finds that Neels's no-intercept simple linear regression model *a priori* assumes no fixed costs for a modeled cost component. Accordingly, the Commission concludes that because Neels's no-intercept model assumes all costs are variable, Neels's component-level regression analysis is significantly flawed. The Commission

rejects the regression results for these 31 cost components. Independent of Neels's enterprise-level analysis, which concludes that hidden variable costs exist, the Commission does not accept the results of Neels's component-level analysis, which attempts to identify the individual cost components that may contain hidden variable costs.

3. Allocating Hidden Variable Costs to Products

For the cost components where Neels calculates hidden variable costs, he recommends attributing these costs to individual products. Neels Report at 46-47; Petition, Proposal Two at 10-11. UPS claims that, at a minimum, the Commission should attribute hidden variable costs to products for the cost components that UPS believes "are currently wrongly treated as entirely fixed."[119]

For the "entirely fixed" cost components, Neels proposes to allocate hidden variable costs based on the product's "respective shares of overall attributable costs" as provided in the preceding year's ACR.[120] Neels Report at 46; Neels Reply Comments at 39. To justify his proposed allocation methodology, Neels discusses how private sector for-profit companies allocate overhead costs to individual products. Neels Report at 53-55. Neels states that such allocation is generally done "on some sort of

[119] Petition, Proposal Two at 11. Per Neels's definition, the "entirely fixed" cost components are those that do have zero attributable costs for all mail classes. Neels Report at 41. However, in the filed documentation, Neels provides inconsistent lists of "entirely fixed" cost components, for which he believes the Commission should adopt his results. Specifically, in his initial report, Neels identifies 15 "entirely fixed" components. Neels Report at 47; Petition, Proposal Two at 11. In his reply comments, Neels provides a list of 14 components that he identifies as "100% Fixed." Neels Reply Comments at 42. Five of these fourteen cost components are not on the list of "entirely fixed" components Neels provides in his initial report. *Compare* Neels Report at 47 *with* Neels Reply Comments at 42.

[120] In his reply comments, responding to Bradley, Neels recommends attributing hidden variable costs to "individual products based on their respective shares of overall attributable costs in the *same* fiscal year, and not…in the *preceding* year." Neels Reply Comments at 39 (emphasis in original). Neels also clarifies that the worksheets filed with his original report illustrate this fact. *See* UPS-RM2016-2-LR-NP1. However, since in his analysis, Neels relies on the most recent (preceding) fiscal year ACR data, the shares of attributable costs that he refers to are from the preceding fiscal year's ACR.

proportional basis," which "provides a way of accounting for the fact that these costs are likely to expand as a result of growth in sales." Neels Report at 54-55.

For other modeled cost components with statistically significant slopes and containing "a mixture of fixed and attributable costs," Neels also urges the Commission to adopt his calculation of hidden variable costs because these components contain "an 'incumbent' costing model" that produces an incorrect mixture of fixed and attributable costs. *Id.* at 47; *see* Neels Reply Comments at 41. For these cost components, Neels seeks to attribute the component's hidden variable costs "in proportion to the attribution implied by the legacy model unless and until further study suggests otherwise." Neels Report at 47. Neels urges the Commission to "require the Postal Service either to update its costing procedures or to produce current evidence supporting their ongoing use." *Id.*

Current Postal Service methods to calculate volume-variable costs and allocate them to products already include measurements of certain proportions. To determine the volume-variable cost pool, the Postal Service uses the relationship between each cost element's costs and its cost driver. The Postal Service then proportionally assigns volume-variable costs to products (*e.g.,* based on the products' share of the cost driver). FY 2015 Summary Description of Costs, Appendix H at H-3-H-5.

None of these measurements, however, include any products' shares of attributable costs that Neels and UPS suggest.

"Entirely fixed" cost components do not have any attributable costs and, consequently, these cost components do not have any volume-variable costs presented in the Postal Service's FY 2014 CRA report. Furthermore, if any hidden variable costs are reliably identified in the entirely fixed cost components, they should represent actual volume-variable costs of the CRA cost component. Therefore, it seems logical to distribute the identified hidden variable costs to products using one of the existing

Postal Service's distribution methods applicable for the particular cost element (where these hidden variable costs were found).

Neels, however, does not explain why existing Postal Service cost distribution methods cannot be used to allocate hidden variable costs to products. The Postal Service uses one of three proportion-based methods to assign volume-variable costs to products, depending on the CRA cost component. *Id.* at H-4-H-5.

When applying either the distribution key method[121] or the constructed marginal cost method, the Postal Service identifies a cost driver prior to determining the volume-variable cost pool and distributing the identified volume-variable costs to products.[122] This cost driver might be different for different activities ("cost elements") in a cost component. For cost components that contain support activities, the Postal Service applies the piggyback method, which distributes the support component's volume-variable costs to products "in the same percentages as the primary component."[123]

Neels fails to consider the Postal Service's existing cost distribution methods by using the same attributable costs shares for all cost components. Additionally, Neels ignores the important differences in types of activities between the costs components. Furthermore, Neels ignores the difference in variabilities that can be derived from the econometric equations he estimated to find hidden variable costs. Bradley Comments at 56. Commenters assert that neither UPS nor Neels properly justify why the overall

[121] This method is also called the volume variability method. *Id.* at H-4.

[122] In the distribution key method, volume-variable costs are determined based on the elasticity of the cost driver and the cost component, assuming that product volume is linearly homogenous with the cost driver. In the constructed marginal cost method, volume-variable costs are determined by two elasticities: the elasticity of the cost driver and the cost component and the elasticity of the cost driver and product volume. *Id.* at H-4-H-5.

[123] *Id.* at H-5. In the piggyback method, volume-variable costs of the support component are determined using the volume variability of the related primary cost component.

attributable costs shares would work as a good distribution key to allocate hidden variable costs. Postal Service Comments at 27, 32; Bradley Comments at 55-56.

As discussed above, the Commission finds that Proposal Two does not reliably identify hidden variable costs. Accordingly, there are no volume-variable costs to allocate at this time. Nevertheless, the Commission cannot accept a proposed methodology for allocating any identified volume-variable costs based on the respective shares of overall attributable costs. The proposed methodology for allocating hidden variable costs ignores accepted methods for the Postal Service's cost allocation and fails to justify why this allocation method improves the quality, accuracy, or completeness of the data. Additionally, the proposed allocation methodology ignores differences in activities between cost components and its elements (including relevant cost drivers and cost variabilities). Proposal Two does not reliably identify a causal relationship between hidden variable costs and products pursuant to section 3622(c)(2). Therefore, it cannot represent an improvement over the current attribution methodology as required by section 3652(e)(2).

4. Further Examination of Cost Classification

In its Petition, UPS alleges that the Postal Service improperly classifies volume-variable costs as institutional costs. Petition at 7. UPS cites the McBride Paper, which characterizes the Postal Service's categorization of costs as subjective. Petition, Proposal Two at 4 (citing McBride Paper at 8). UPS criticizes the Postal Service for failing to identify any empirical analyses or methodology used to determining whether "cost pools that have a zero volume variability, meaning the costs do not change with variations in the amount of volume handled." UPS Reply Comments at 44 (citing Postal Service Response to CHIR No. 2, question 4). Because the Postal Service does not identify fixed costs, UPS asserts that "the Postal Service utilizes an *ad hoc* cost classification approach based on its own subjective judgments." *Id.*

Several commenters urge the Commission to consider whether costs that are classified as fixed are truly fixed and whether the volume variability of cost components can be measured more accurately. For example, the Public Representative recommends that to address the concerns expressed in Proposal Two, the Commission should initiate a subsequent rulemaking docket to examine the classification of individual cost components and assignment of costs to them. PR Comments at 42-43, 54. In this proceeding, the Public Representative suggests that the Commission could review the assumptions that the Postal Service relies on to distinguish between fixed and variable cost for each cost component. *Id.* at 54. Similarly, NPPC states that "it is appropriate to reconsider, from time to time, whether purportedly fixed costs are, in fact, truly fixed, just as it is appropriate to review whether the volume variability of cost components can be measured more accurately." NPPC Comments at 8.

D. Conclusion and Summary of Commission Findings

Based on analysis of the material submitted in this instant docket, the Commission finds that Neels's enterprise-level econometric analysis does not reliably identify the presence of hidden variable costs. The Commission also finds that Neels's component-level econometric analysis fails to reliably identify hidden variable costs in cost components that he argues contain such costs. Furthermore, the Commission concludes that Neels's proposed cost allocation method fails to establish a causal relationship between hidden variable costs and specific products. Accordingly, the Commission finds that Proposal Two does not reliably identify a causal relationship between hidden variable costs and products pursuant to section 3622(c)(2). Consequently, Proposal Two does not represent an improvement over the current methodology pursuant to section 3652(e)(2).

However, the Commission recognizes that UPS raises reasonable questions regarding the costing methodology employed by the Postal Service. To improve transparency of the Postal Service's periodic reports on its costing methodology, and to

better understand what can be done to improve costing methodology, the Commission directs the Postal Service to include more specific and detailed information with its annual Summary Description of USPS Development of Costs by Segment and Components report (Summary Description of Costs report).

This report is publicly filed by the Postal Service each July and includes specific references to the CRA report of the preceding fiscal year's ACR. *See* FY 2015 Summary Description of Costs, Preface at i. The Summary Description of Costs report is currently divided into 17 sub-reports, one sub-report for each of the 17 cost segments identified in the annual CRA report. These sub-reports then discuss the cost component groups contained within each cost segment.

From the outset, the Commission recognized the need for the Postal Service to provide brief narrative explanations of the "analytical principles that have been used to arrive at the estimates in the most recent [ACR]" and the reasons why these analytical principles were applied.[124] The Commission clarified that it intended for these brief narrative explanations to serve as a "quick guide to the non-expert in understanding the arcane world of postal cost, volume, and revenue analysis."[125] Additionally, the Commission believed that these quick guides would help make "postal analysis more accessible to the lay public." Order No. 203 at 40.

The required information will further the Commission's original intent to make postal cost, volume, and revenue analysis more accessible to the public. The Commission notes that the level of detail provided in each Summary Description of Costs sub-report differs by cost segment. Although each cost segment sub-report contains information on accrued and attributable costs by cost component group, for

[124] Docket No. RM2008-4, Notice of Proposed Rulemaking Prescribing Form and Content of Periodic Reports, August 22, 2008, at 20 (Order No. 104).

[125] Docket No. RM2008-4, Notice of Final Rule Prescribing Form and Content of Periodic Reports, April 16, 2009, at 40 (Order No. 203).

some cost segments, cost component groups consist of a single cost component. For example, each cost component group in Cost Segments 1, 8, and 17 contain only one cost component. At the same time, in other cost segments, there are cost component groups that contain more than one cost component, but the sub-reports do not identify the cost components that are included in each cost component group. Accordingly, it is difficult for stakeholders and laypersons to know whether a cost component group contains only one cost component or several cost components. By requiring the Postal Service to provide information at a cost component level, the Commission intends for the public to have access to data reported at a consistent level of detail for all cost segment sub-reports.

Additionally, some cost segment sub-reports provide detailed explanations of the methodology used to calculate costs and distribute them to products, while others merely refer to other cost segment sub-reports. For example, the Cost Segment 3 sub-report provides a detailed description for cost classification and distribution, as well as variability analysis. In contrast, the Cost Segment 2 sub-report simply references the Cost Segment 3 sub-report and other cost segment sub-reports (*i.e.,* sub-reports for Cost Segments 1-12 and 18). Cross-referencing between cost segment sub-reports may unnecessarily confuse stakeholders and laypersons. By requiring that the Postal Service provide the same level of detailed explanation of its costing methodology for each cost segment sub-report, the Commission seeks to improve the clarity of the reported information.

Some cost segment sub-reports provide references to supporting materials that the Postal Service files, but other reports do not. For example, the Cost Segment 7 sub-report refers to the original documents (docket numbers and library reference names) with the econometric analysis for calculating volume-variable costs. At the same time, the Cost Segment 6 sub-report only references the Cost Segment 7 sub-report. By requesting that the Postal Service consistently include references to the

supporting materials that accompany the previous year's ACR in its Summary Description of Costs reports, the Commission seeks to help stakeholders and laypersons navigate the Postal Service's cost, volume, and revenue analysis.

To improve transparency, the Commission directs the Postal Service to provide the following information for each cost segment sub-report:[126]

1. *Provide a detailed description of cost components by each component group in the cost segment.* Specifically, for each cost component group identified in the segment-level sub-reports of the Summary Description of Costs report, the Postal Service must provide a list of cost components that comprise this cost component group including the cost component's name and number as identified in the ACR library reference USPS-FY**-31 (worksheet FY**.B.Public) of the referenced preceding fiscal year.
2. *Provide cost data for each identified cost component by each component group, and by each cost segment*. The required cost data include accrued costs, attributable costs (differentiating between volume-variable, inframarginal, and product-specific costs), and other/institutional costs.
3. *Provide all applicable source information from the preceding year's ACR library references, as well as direct references to any other documentation, where feasible.* Specifically, references/detailed source information must be provided for all listed:
    - cost data for each cost segment, cost component group, and individual cost component;
    - variability (cost elasticity) data for all cost segments that include volume-variable costs, and by each cost element (postal activity) for which the Postal Service estimates variability;[127] and

[126] Table B-1 in Appendix B provides illustration of the requested information.

[127] For each estimated variability, the Postal Service must provide a direct reference to the document that contains the underlying methodology (such as an ACR library reference or any other source, but not to another section of the Summary Description of Costs).

- Postal Service management systems/databases.[128]

VI. SECTION 703(d) REQUIREMENT

A. Overview

UPS explains that the PAEA relieved the Postal Service of certain price setting conditions so that it could better compete with private companies in the competitive products market. Petition at 3. UPS contends that in exchange for new pricing flexibilities and in recognition of the Postal Service's "inherent incentive" to expand its competitive ventures at the expense of its market dominant mail customers, Congress mandated that "the Postal Service could not subsidize its expansion into competitive parcel delivery markets with revenues it enjoys from the products it sells pursuant to the letter monopoly." *Id.* at 4. UPS asserts that Congress included the requirements of 39 U.S.C. § 3633(a) to prevent the Postal Service from competing unfairly in competitive markets.[129]

UPS states that the Postal Service's costing practices misclassify variable costs, which should be attributed to products, as institutional costs and the Postal Service is not fully accounting for the costs of competitive products. Petition at 7, 9. UPS asserts that this cost misclassification enables the Postal Service to "largely ignore" such costs when setting competitive product prices. *Id.* at 10. As a result, UPS concludes that the Postal Service's costing practices allow the Postal Service to unfairly compete against

[128] Examples include but are not limited to Rural Carrier Cost System (RCCS), In-Office Cost System (IOCS), Management Operating Data System (MODS).

[129] *Id.* at 13-14 *(*citing S. Rep. No. 108-318, at 7, 14-15 (2004); H.R. Rep. No. 109-66, pt. 1, at 44 (2005)). *See* 39 U.S.C. § 3633(a) (prohibits the subsidization of competitive products by market dominant products; requires that each competitive product cover its own attributable costs; and directs competitive products to collectively cover an appropriate share of the Postal Service's institutional costs); 39 U.S.C. § 404a (prohibits any regulation the effect of which is to preclude competition or establish terms of competition absent a demonstration by the Postal Service that the regulation does not create an unfair advantage for itself).

private sector companies, which leads to distortion of the competitive parcel delivery market and harm to the competitors and mailers. *Id.* at 16-17.

B. Summary of Comments

1. Requirement to Consider Competitive Market Dynamics

The Public Representative asserts that section 703(d) of the PAEA requires the Commission to consider current competitive market conditions when analyzing UPS's proposals and "the claimed need to relieve market distortions." PR Comments at 2-3, 15-18, 44. The Public Representative states that:

> [s]ection 703(d) of the PAEA provides the Commission an explicit and continuing statutory responsibility when considering revising its regulations under section 3633 that it 'shall take into account…subsequent events [after the Federal Trade Commission (FTC) Report] that affect the continuing validity of the estimate of the net economic effect' of federal laws that apply differently to the Postal Service and to private companies providing similar products.[130]

The Public Representative asserts that because UPS seeks to modify how attributable costs are calculated, it seeks to modify regulations required under section 3633(a)(2). PR Comments at 16. Accordingly, he maintains that section 703 of the PAEA requires the Commission to review the impact of changes in the competitive products market on the net economic effect of federal laws when considering Proposals One and Two. *Id.* at 16, 18.

The Public Representative maintains that section 703 clearly indicates that Congress intended the Commission to consider the "changes in the net economic effect

[130] *Id.* at 16 (citing Federal Trade Commission, Accounting for Laws that Apply Differently to the United States Postal Service and its Private Competitors, December 2007 (FTC Report) (available at: *http://www.prc.gov/sites/default/files/archived/FTC%20Report%20Dec2007.pdf*)).

of federal law" that might influence the determination to revise the regulation. *Id.* at 18. He asserts that such consideration permits the omission of "certain costs with a causal relationship to [a product]" from that product's attributable costs if the "purpose of the PAEA to foster a level playing field would be, or might be, diminished." *Id.* He describes several changes to the competitive products market that impact the net economic effect of the federal laws that govern and regulate the Postal Service. *Id.* at 17, 18. Such changes include transfers of market dominant products to the competitive product list and price increases for competitive products.[131]

In its reply comments, UPS asserts that impacts on the market are immaterial and that the "relevant inquiry, however, is whether the Postal Service's cost attribution practices comply with [the] PAEA[.]" UPS Reply Comments at 33. In response to the Public Representative's suggestion that the Commission consider "other factors," UPS argues that Congress did not direct the Commission to consider such factors when determining cost attribution.[132] Rather, UPS contends that section 3633(a)(2) requires the Commission to attribute any direct or indirect postal costs with a causal connection to competitive products "without considering the consequences of that attribution." UPS Reply Comments at 35 (citing PR Comments at 15).

Furthermore, UPS maintains that Congress intended for the Commission to consider market conditions only when determining the appropriate share of institutional costs to be covered by competitive products. *Id.* at 36. To the extent that the Commission considers the recommendations of the FTC Report, UPS states that the

[131] *Id.* at 17, 18. The Public Representative identifies four competitive parcel products that have transferred from the market dominant to the competitive product list: First-Class Package Service, Parcel Select, Standard Post (now Retail Ground), and Parcel Return Service. *Id.* at 17.

[132] *Id.* at 35 (citing PR Comments at 15). "Other factors" include "the impact of additional attribution on Postal Service revenues, rates, and profits, and the effect on competition in the marketplace for the Postal Service's products and on [the] prices to be paid by the consuming public." PR Comments at 15.

report supports Proposal One. *Id.* UPS asserts that the FTC Report identified numerous legal advantages for the Postal Service, including "implicit subsidies" the Postal Service receives due to its letter and mailbox monopolies. *Id.* (citing FTC Report at 85). UPS argues that Proposal One is consistent with the FTC's recommendation that the Commission should take action to "neutralize the effect of the [Postal Service's] implicit subsidies by requiring the [Postal Service] to account for them when calculating its costs." UPS Reply Comments at 37 (citing FTC Report at 81).

In its reply comments, Amazon argues that section 703(d) requires the Commission consider subsequent events that impact the FTC's estimated net economic effect only when the Commission revises regulations promulgated pursuant to section 3633. Amazon Reply Comments at 14 n.8. Because rejecting UPS's proposals does not require the Commission to revise its regulations, Amazon posits that section 703(d) is not applicable. *Id.* at 15 n.8.

Amazon further asserts that if the Commission analyzed subsequent events since the FTC Report and their impact on the net economic effect of federal laws that apply differently to the Postal Service and to its competitors, it would confirm Proposals One and Two lack merit.[133] Amazon states that several developments have reduced the risk that the benefits and burdens of the Postal Service, as a federal entity, could disadvantage competitors. *Id.* at 14. Amazon comments that events such as "the transfer of several market dominant products to the competitive product list, the substantial rise in the average prices charged by the Postal Service for its competitive products since 2007, and the steadily growing profitability of the major private competitors" are among developments that may have reduced the risk. *Id*.

[133] *Id*. Additionally, Amazon asserts that the FTC estimated amount of the advantages and disadvantages of being a federal entity are small when compared to the potential impact of Proposals One and Two. *Id.* at 13-14.

In his reply comments, the Public Representative claims that section 3633(b) reinforces the arguments made in his initial comments regarding the relevancy of prevailing competitive market conditions. PR Reply Comments at 1. The Public Representative asserts that section 3633(b) requires the Commission to consider "all relevant circumstances, including the prevailing competitive conditions in the market," during its 5-year review to determine the competitive products' appropriate share of the Postal Service's institutional costs. *Id.* at 2 (quoting 39 U.S.C. § 3633(b)) (emphasis omitted). He contends that, pursuant to section 703, the Commission must review prevailing conditions in the competitive market because subsequent events that impact the net economic effect of federal laws have occurred. *Id.* at 2-3.

2. Current Conditions in the Competitive Product Market

a. Market Shares

The Public Representative states that the Petition paints a picture of "highly subsidized competitive products eating away at [UPS's] market share and unfairly competing in a tilted playing field."[134] Specifically, UPS asserts that the "Postal Service is slashing prices of its competitive products to drive up its market share."[135] The Public Representative and Amazon argue that this picture is inaccurate because UPS and FedEx successfully compete in the Priority Mail/Ground market and that the Postal Service's overall share of that market is relatively small.[136] The Public Representative

[134] PR Comments at 52. The NALC characterizes UPS's Petition as its "latest ploy...to use rhetoric about supposed unfair postal subsidies to try to gain a competitive advantage for itself in the parcel market." NALC Reply Comments at 1.

[135] Petition at 5. UPS states that in September 2014, the Postal Service cut its commercial Priority Mail rates by as much as 58 percent. *Id.*

[136] PR Comments at 51-52; Amazon Comments at 72. In its reply comments, Amazon cites recent press releases from both UPS and FedEx that indicate that the private sector companies are "profitable, growing, and investing heavily in expanding their capacity and improving their technology." Amazon Reply Comments at 15.

states that the UPS Ground and FedEx Ground combined share represents 84.6 percent of the revenue in the Priority Mail/Ground market. PR Comments at 51. Similarly, Amazon asserts that the Postal Service's overall share of the Priority Mail/Ground market is only 16 percent and 15 percent by volume and revenue respectively. *See* Amazon Comments at 72.

The Postal Service asserts that UPS's "Market Share Analysis" data[137] are inconsequential because UPS attempts to compare Priority Mail volumes with a combination of UPS and FedEx volumes for each quarter, when FedEx uses a different quarterly calendar than UPS and the Postal Service. Postal Service Comments at 37. The Postal Service notes that the November/December holiday season falls in two separate quarters for FedEx, while it falls in a single quarter for UPS and the Postal Service. *Id*. The Postal Service asserts that this difference improperly inflates the Postal Service's share of the total volumes in FY 2015 Quarter 1 and UPS and FedEx's combined share in FY 2015 Quarter 2. *Id*. In its reply comments, UPS states that its workpapers matched quarters to account for seasonal impacts on the data. UPS Reply Comments at 40 n.47.

The Postal Service also asserts that UPS's "Market Share Analysis" data do not provide a complete picture of the competitive package delivery market. Postal Service Comments at 38. The Postal Service observes that UPS's analysis compares Priority Mail against UPS Ground and FedEx Ground and excludes UPS and FedEx's 2- and 3-day air offerings. *Id*. The Postal Service states that competition between Priority Mail and UPS Ground and FedEx Ground, does not exclude the possibility that Priority Mail also competes with UPS's and FedEx's 2-day or 3-day services. *Id*. On the contrary, the Postal Service states that Priority Mail competes with 2-day and 3-day services. *Id*.

[137] UPS Response to CHIR No. 5, file "CHIR No 1 Market Share Analysis.xls."

Accordingly, the Postal Service concludes that UPS's data does not support an alleged shift in volume numbers because they exclude a segment of the relevant market.[138]

b. Competitive Product Pricing

PSA, the Public Representative, and the Postal Service opine that Priority Mail prices do not support the claim that the Postal Service is attempting to subsidize its competitive products. PSA comments that the Postal Service has increased prices for its competitive products beyond the rate of inflation. PSA Comments at 3-4. Additionally, the Public Representative states that many Priority Mail prices are higher when compared to UPS and FedEx Ground prices. PR Comments at 48. He states that it may make "little sense to order a change in costing methodology that can force a price increase on the Postal Service when the Priority Mail prices are already considerably higher than their competitors." *Id.* at 50. The Postal Service asserts that any comparison of list prices between the Postal Service, UPS, and FedEx would be futile because the proportion of customers who pay undisclosed discounted negotiated prices is much larger for UPS and FedEx than for the Postal Service. Postal Service Comments at 36.

In its Petition, UPS portrays the Postal Service's September 2014 price change as an attempt to "slash" commercial Priority Mail rates and snap up market share. Petition at 6. Amazon, PSA, and the Postal Service state that UPS incorrectly characterizes the overall effect of the Postal Service's September 2014 price change.[139] Additionally, Amazon, PSA, and the Postal Service assert that UPS's focus on the

[138] *Id*. at 38-39. The Postal Service also asserts that there is a possibility for mail volume to shift not only between the included categories, but among included and excluded categories. *Id*.

[139] These commenters observe that the deepest price decreases involved rate cells for heavy weight mailpieces. Amazon Comments at 70; PSA Comments at 5; Postal Service Comments at 36. The commenters argue that since these rate decreases were offset by increases in other, larger-volume, rate cells, the net effect of the implemented price change was zero. Amazon Comments at 70; PSA Comments at 5; Postal Service Comments at 36.

September 2014 price change is too narrow and that overall competitive product prices have significantly increased.[140] Furthermore, Amazon and PSA state UPS's share remained relatively stable after the Postal Service's September 2014 price change despite UPS's claims otherwise.[141] Amazon and the Postal Service also assert that the slight change in market share could have been the result of expanded use of dimensional weighted pricing by UPS and FedEx.[142]

In its reply comments, UPS addresses commenters' concerns related to the Postal Service's September 2014 price change. UPS states that the commenters' argument that the price decreases were balanced by price increases, so that the net price change was zero, "obscures how drastic the price cuts were in important commercial rate categories." UPS Reply Comments at 38. Specifically, UPS argues that the Postal Service reduced its rates as much as 58 percent for price cells that are the "most popular for the e-commerce market" and for which Postal Service maintains "substantial price advantages." *Id*.

Additionally, in response to commenters' argument that the Postal Service recently increased competitive product prices, UPS asserts that such a significant price

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[140] Amazon Comments at 70; PSA Comments at 5 (since the passage of the PAEA, the accumulative price increase for Priority Mail has been well over the rate of inflation); Postal Service Comments at 35 (Priority Mail prices have increased by 39 percent, Parcel Select Lightweight prices increased by 78.5 percent and First-Class prices increased by 32.8 percent since 2007). *See also* NALC Reply Comments at 3 (since PAEA, competitive product prices have increased faster than market dominant product prices).

[141] Amazon Comments at 72-73; PSA Comments at 5. The Postal Service states that UPS failed to show that there was an abnormal shift in volume or market share following the September 2014 price change or that any shift in volume or market share that may have occurred is solely attributable to the price change. Postal Service Comments at 45.

[142] Amazon Comments at 72, Postal Service Comments at 41. The Postal Service comments that UPS's data show that Ground volume growth declined sharply in FY 2015, Quarter 2, the quarter in which UPS expanded Ground dimensional weight pricing. Postal Service Comments at 41. Additionally, the Postal Service notes that the continued lower rates of Ground volume growth in FY 2015 quarters 3 and 4 could be explained by delayed implementation or waivers. *Id*.

increase was possible because the previous prices were set too low.[143] UPS cites comments submitted in Docket No. CP2016-9, in which the Public Representative opined that it was "likely that the accepted [costing] methodology does not attribute all appropriate costs to competitive products." Docket No. CP2016-9 PR Comments at 5. Additionally, UPS states the Postal Service retained its 2014 discounts for the rate cells most popular among e-commerce mailers. UPS Reply Comments at 38-39.

C. Commission Analysis

1. Statutory Standard

The threshold issue that needs to be addressed is whether the Commission is required to review competitive market conditions when considering Proposals One and Two for adoption as the Public Representative suggests. For reasons discussed below, the Commission determines that such a review is not required.

In the PAEA, Congress directed the FTC to prepare a report that identified federal and state laws that apply differently to the Postal Service related to competitive products and similar products offered by private sector companies.[144] The FTC Report included recommendations to bring the legal differences to an end and, in the interim, account for the net economic effect that results from these legal differences. *Id.* § 703(b). Section 703(d) of the PAEA provides that the Commission:

> shall take into account the recommendations of the [FTC], and subsequent events that affect the continuing validity of the estimate of the net economic effect, in promulgating or revising the regulations required under section 3633 of title 39, United States Code.

[143] UPS Reply Comments at 38 (citing Docket No. CP2016-9, Public Representative Comments on Postal Service Notice Concerning Changes in Rates of General Applicability for Competitive Products, November 3, 2015, at 5 (Docket No. CP2016-9 PR Comments)).

[144] PAEA section 703(a). Section 703 is reproduced in the notes of 39 U.S.C.A. § 3633.

Id. § 703(d).

By its terms, section 703(d) only applies when the Commission promulgates or revises regulations required under section 3633. Section 3633 requires the Commission to establish and, from time to time, revise regulations to prohibit cross-subsidization of competitive products by market dominant products;[145] ensure that each competitive product covers its attributable costs;[146] and ensure that competitive products, as a whole, collectively cover an appropriate share of the Postal Service's institutional costs.[147] In Docket No RM2007-1, the Commission promulgated regulations as required by section 3633.[148] In Order No. 43, the Commission adopted final rules that outlined the standards the Commission applied when determining competitive products' compliance with section 3633. Docket No. RM2007-1, Order No. 43 at 137-138. These regulations are codified in 39 C.F.R. § 3015.7.

In Docket No RM2012-3, pursuant to 39 U.S.C. § 3633(b), the Commission evaluated whether rule 3015.7(c), which set the competitive products' appropriate share at a minimum of 5.5 percent of institutional costs, should be retained, modified, or eliminated.[149] In its first 5-year review of the competitive products' appropriate share, the Commission recognized that section 3633(b) requires the Commission to consider "all relevant circumstances, including the prevailing competitive conditions in the market." Docket No. RM2012-3, Order No. 1449 at 13; *see* 39 U.S.C. § 3633(b). In Order No. 1449, the Commission explained that when taking into consideration the

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[145] 39 U.S.C. § 3633(a)(1).

[146] *Id.* § 3633(a)(2).

[147] *Id.* § 3633(a)(3).

[148] Docket No. RM2007-1, Order No. 2, Advance Notice of Proposed Rulemaking on Regulations Establishing a System of Ratemaking, January 30, 2007, at 8. Docket No. RM2007-1, Order No. 26, Order Proposing Regulations to Establish a System of Ratemaking, August 15, 2007, at 68-74, 124.

[149] Docket No. RM2012-3, Notice of Proposed Rulemaking to Evaluate the Institutional Cost Contribution Requirement for Competitive Products, January 6, 2012, at 2 (Order No. 1108). *See* Docket No. RM2012-3, Order No. 1449 at 1.

"prevailing conditions of the market," it considered "whether there [was] evidence suggesting the Postal Service benefited from a competitive advantage with respect to its competitive products;" "changes to the Postal Service's [competitive products'] market share;" and "changes to the market and to the Postal Service's competitors." Docket No. RM2012-3, Order No. 1449 at 14. After taking into consideration these and other relevant factors,[150] the Commission found rule 3015.7 should be retained in its current form. *Id.* at 26.

The Public Representative asserts that Proposals One and Two seek to revise regulations related to cost attribution by requiring the Postal Service to include inframarginal costs and to some costs currently considered as institutional costs in its calculation of attributable costs. PR Comments at 16. Because Proposals One and Two seek to modify how attributable costs are calculated, the Public Representative argues that they seek to revise a regulation required under 39 U.S.C. § 3633(a)(2). *Id.*

However, the Petition specifically requests "the Commission to initiate rulemaking proceedings to change how the United States Postal Service accounts for the costs of competitive products in its periodic reports." Petition at 1. The request was made pursuant to 39 C.F.R. § 3050.11, which relates to proposals to change an accepted analytical principle applied to the Postal Service's periodic reports to the Commission.[151] Accordingly, the Commission must determine whether analytical principles applied to

[150] Other relevant factors include competitive products' contribution to institutional costs over the last 5 years; changes to the competitive product list and changes to the mail mix; and uncertainties resulting from then-pending nature of service proceedings and financial uncertainty of the Postal Service. *Id.* at 19-24.

[151] *Id.*; *see* 39 C.F.R. § 3050.11. An analytical principle is "a particular economic, mathematical, or statistical theory, precept, or assumption applied by the Postal Service in producing a periodic report to the Commission." 39 C.F.R. § 3050.1(c). An accepted analytical principle is an "analytical principle that was applied by the Commission in its most recent Annual Compliance Determination unless a different analytical principle subsequently was accepted by the Commission in a final rule." 39 C.F.R. § 3050.1(a).

calculate attributable costs are "regulations required under section 3633 of title 39, United States Code." PAEA § 703(d).

2. Analytical Principles are not Rules Required by Section 3633

The PAEA mandates several reporting requirements; specifically, it directs the Postal Service to file an annual periodic report to the Commission no later than 90 days after the end of each fiscal year. 39 U.S.C. § 3652(a). The PAEA further instructs that this annual periodic report "shall analyze costs, revenues, rates, and quality of service, using such methodologies as the Commission shall by regulation prescribe." *Id.* § 3652(a)(1). In Docket No. RM2008-4, the Commission prescribed such methodologies and stated that the analytical principles it used in the most recent ACR would serve as a baseline for the Commission's accepted analytical principles. Docket No. RM2008-4, Order No. 104 at 26, 31-32. Also in Docket No. RM2008-4, the Commission provided that the Postal Service shall only use accepted analytical principles in the development of its annual periodic reports.[152]

Additionally, in RM2008-4, the Commission stated that section 3652(e)(2) "authorizes the Commission to initiate proceedings designed to improve the data in the Postal Service's annual reports." Docket No. RM2008-4, Order No. 104 at 31. Accordingly, the Commission promulgated rule 3050.11 to provide the Postal Service, the Commission, and other interested parties an opportunity to propose changes to accepted analytical principles. *Id*. Rule 3050.11 also provides the Commission a flexible framework within which to consider such proposals. *Id*.

The Commission's regulations relating to analytical principles make clear that the purpose of these analytical principles is to govern the quality, accuracy, and

[152] Docket No. RM2008-4, Order No. 104 at 42; Docket No. RM2008-4, Order No. 203 at 60. *See* 39 C.F.R. § 3050.10. The Postal Service may use an analytical principle prior to its acceptance by the Commission with respect to its submissions under rule 3050.26.

completeness of the data the Postal Service provides in its annual periodic report. In contrast, section 3633 and its required regulations are "intended to ensure that the Postal Service competes fairly in the provision of competitive products." S. Rep. No. 108-318, at 19 (2004). Accordingly, the Commission finds that the analytical principles are regulations promulgated and revised under section 3652, not section 3633. In contrast, as discussed above, rule 3015.7(c) which establishes competitive products' minimum contribution to institutional costs is clearly a regulation required under 39 U.S.C. § 3633.

3. Nature of Rule 3050.11 Proceedings

The nature of the Commission's analysis, when it considers proposals to change analytical principles, also supports the conclusion that consideration of Proposals One and Two does not require section 703(d) analysis. An analytical principle is defined as "a particular economic, mathematical, or statistical theory, precept, or assumption applied by the Postal Service in producing a periodic report." 39 C.F.R. § 3050.1(c). Congress authorized the Commission to initiate proceedings "to improve the quality, accuracy, or completeness of Postal Service data required by the Commission." 39 U.S.C. § 3652(e)(2). The Commission incorporated this standard when it promulgated the procedural rules applicable to proposals to change analytical principles. *See* 39 C.F.R. § 3050.11(a). Accordingly, when the Commission considers changes to analytical principles it must make a factual determination of whether the proposed change will "improve the quality, accuracy, or completeness" of the data included in the Postal Service's periodic reports. The considerations that section 703(d) of the PAEA directs the Commission to take into account are not applicable when the Commission reviews a proposed change to an analytical principle.

In contrast, the considerations the Commission shall take into account under section 703(d) of the PAEA are clearly applicable when the Commission reviews the competitive products' institutional cost contribution requirements under section 3633(b).

In its first 5-year review of the competitive products' appropriate share, the Commission recognized that section 3633(b) requires the Commission to consider "all relevant circumstances, including the prevailing competitive conditions in the market." Docket No. RM2012-3, Order No. 1449 at 13; 39 U.S.C. § 3633(b). In Order No. 1449, the Commission explained that when taking into consideration of the "prevailing conditions of the market," it considered "whether there [was] evidence suggesting the Postal Service benefited from a competitive advantage with respect to its competitive products;" "changes to the Postal Service's [competitive products'] market share;" and "changes to the market and to the Postal Service's competitors." Docket No. RM2012-3, Order No. 1449 at 14. The Commission also considered other relevant factors such as competitive products' contribution to institutional costs during the last 5 years; changes to the competitive product list and changes to the mail mix; and uncertainties resulting from then-pending nature of service proceedings and financial uncertainty of the Postal Service. *Id.* at 19-24.

4. Conclusion

For the reasons discussed above, neither Proposal One nor Proposal Two seek to promulgate or revise regulations required under 39 U.S.C. § 3633. Accordingly, section 703(d) does not apply and the Commission does not need to take into account the recommendations of the FTC Report or events that may affect the continuing validity of the FTC Report's estimated net economic effect.[153]

[153] The Commission notes, notwithstanding uncodified section 703's applicability, that this change in attribution results in an improved, more complete, or more accurate measure of attributable costs as defined by section 3622(c), and represents an improvement in the attribution of costs as required by section 3652(e). Such a change facilitates improved attribution and therefore reduces potential economic distortions.

VII. PROPOSAL THREE

In Proposal Three, UPS requests that the Commission modify the "appropriate share" of institutional costs that must be covered by competitive products. Petition, Proposal Three at 1. Currently, competitive products are required to cover 5.5 percent of total institutional costs.[154]

As discussed previously, in Order No. 2793 the Commission held the consideration of Proposal Three in abeyance until the Commission completed its review of Proposals One and Two. Order No. 2793 at 6-7.

Pursuant to 39 U.S.C. § 3633(b), the Commission is required to review the appropriate share requirement every 5 years to determine if the percentage should be "retained in its current form, modified, or eliminated." The most recent review was initiated on January 6, 2012, in Docket No. RM2012-3. Docket No. RM2012-3, Order No. 1108 at 1. The Commission anticipates conducting its review in conformance with section 3633(b).

VIII. CONCLUSION

As discussed above, the Commission finds the methodology put forth by UPS in Proposal One does not result in a reliably identified causal relationship between inframarginal costs and products, nor does it improve the reliability, accuracy, or usefulness of the Postal Service's data. However, the Commission has noted both the reliably identified causal relationship between incremental costs and products and the accuracy and reliability of using incremental costs for cost attribution. Accordingly, the Commission concludes that it is appropriate to change the Postal Service's costing methodology to better reflect general principles of economic costing. Specifically, the Commission redefines attributable costs to mean the incremental costs of a product or

[154] 39 C.F.R. § 3015.7(c); *see generally* Docket No. RM2012-3, Order No. 1449.

service. Concurrent with this Order, the Commission is issuing a notice of proposed rulemaking to recommend conforming changes to its rules that specifically define or describe attributable costs pursuant to this Order.

Additionally, the Commission concludes that the econometric analysis put forth by UPS in Proposal Two does not reliably identify the presence or the source of hidden variable costs within the Postal Service's institutional costs. Furthermore, the Commission concludes that Neels's proposed method of allocating hidden variable costs fails to establish a causal relationship between these costs and specific products. However, the Commission recognizes that UPS raises reasonable questions regarding the costing methodology employed by the Postal Service. To improve transparency of the Postal Service's periodic reports on its costing methodology, and to better understand what can be done to improve costing methodology, the Commission directs the Postal Service to include more specific and detailed information with its annual Summary Description of Costs report.

As discussed above, because the Commission is required to review the competitive products' appropriate share requirement every 5 years, the Commission declines to consider Proposal Three at this time. The Commission notes that the most recent review was initiated on January 6, 2012, in Docket No. RM2012-3 and anticipates conducting its review in conformance with section 3633(b).

IX. ORDERING PARAGRAPHS

It is ordered:

1. The Commission declines to adopt Proposals One and Two because, for the reasons described in this Order, neither improve the quality, accuracy, and completeness of cost attribution.

2. The Commission directs the Postal Service to use incremental costs as the basis for class-level and product-level attributable costs.

3. The Commission directs the Postal Service to file additional information in its future Summary Description of Costs reports as described in the body of this Order.

4. The Commission declines to consider Proposal Three but will conduct its review as required by section 3633(b).

Stacy L. Ruble
Secretary

APPENDIX A

COMMISSION DISCUSSION OF COST ATTRIBUTION

I. ATTRIBUTABLE COSTING IN A SINGLE-PRODUCT FIRM

Costing in a multi-product firm differs substantially from costing in a single-product firm because tracing the source of costs is more difficult in a multi-product firm. To demonstrate this, this Appendix provides examples of costing in a single-product firm and costing in a multi-product firm. These examples walk the reader through simplified microeconomic costing, economies of scale and scope, and multi-product firm costing principles.

The following example describes the costing involved in the development of a farm. Suppose a farmer wants to create a business that produces apples and sells them in a storefront. To do so, the farmer needs the two components necessary for any single-product firm: **labor** (L) and **capital** (K). Labor includes those workers needed for growing and harvesting the apples, as well as those workers needed to maintain the storefront. The farmer must pay these workers for their labor, but the farmer can increase or reduce their hours at will in response to the farmer's desire to produce more or fewer apples, making labor her **variable cost** (VC). Capital includes those elements needed for maintaining the business, *e.g.,* plots of land, machinery, and software systems. These costs are relatively static and do not vary with the amount of apples produced, making capital her **fixed cost** (FC). The combination of these costs is the **total cost** (TC). The relationship of these costs can be described in the following equations:

$$TC = FC + VC$$

With the inputs in place, the farmer can now determine the cost of producing each apple (A). Because fixed costs do not vary with volume, only the variable cost component of the function adjusts for A. In this example, the farmer's cost function is the following:

$$TC = 500 + 10A$$

In this function, 500 represents the fixed costs of maintaining the business, and 10*A* represents the cost of producing each additional apple. This function can be transformed into a variety of other economic cost concepts:

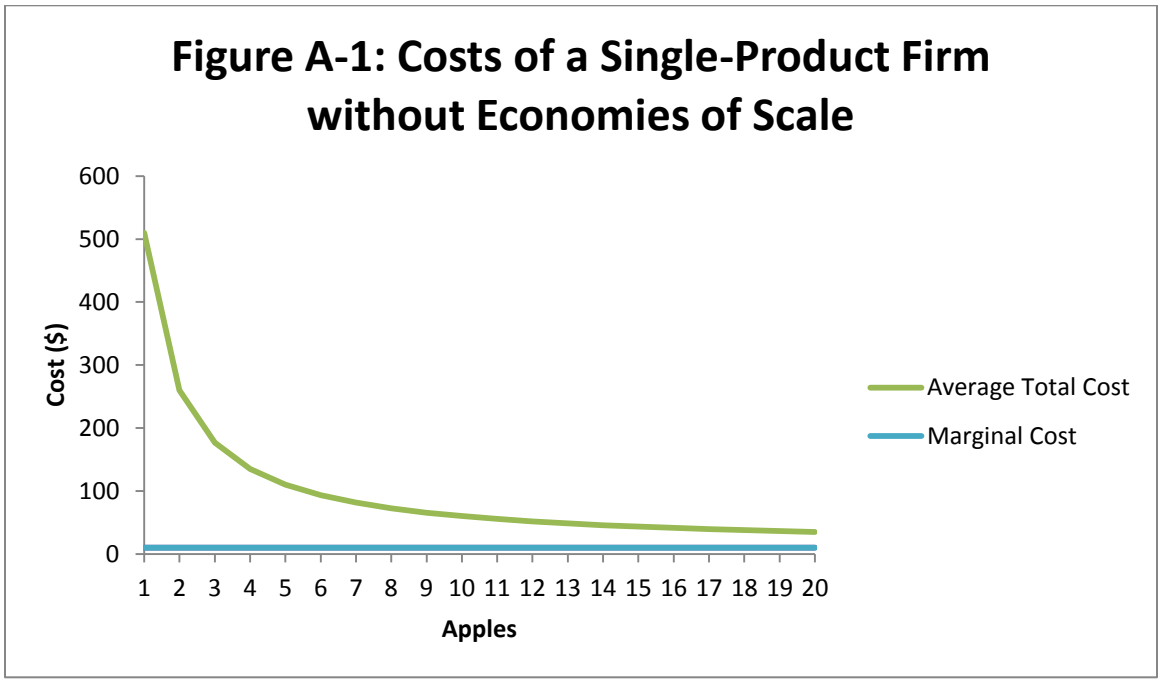
- **Average Total Cost** (ATC): The total cost, divided by the number of apples produced, as shown in the following equation:

$$ATC = \frac{FC + VC}{A} = \frac{500 + 10A}{A}$$

- **Marginal Cost** (MC): The cost of producing an additional apple, as shown in the following equation:

$$MC = \frac{\partial TC}{\partial A} = 10$$

In this example, the marginal cost is constant at 10, meaning that no matter how many apples the farmer produces, each additional apple will impose the same cost on the farm. This function is a derivative and produces the instantaneous rate of change at a given point in a function. In a cost function, the derivative can measure the exact change in total costs resulting from a single additional unit of volume, which is the clearest possible measure of causality (so long as the cost function accurately represents the total costs of the single-product firm). These functions can be modeled as demonstrated in Figure A-1 below:



Marginal cost is the concept used in microeconomic analysis for decision making: the cost of producing an additional unit of output, in contrast with using the resources for something else. It is marginal analysis that determines unit profitability and output decisions.

In order for the farmer to make money on this enterprise, the farmer has to ensure that the price of the apples sufficiently covers both the variable and fixed costs of the farm. The price of the apples, therefore, must exceed the average total cost. Without competition, the farmer could price above average total cost and not suffer any loss in profit. In a competitive market, however, where the farmer cannot control the price, the farmer must produce the volume of apples where the marginal cost is equivalent to the average total cost. This volume is the most economically efficient production point which, if the price is equivalent, would allow the farmer to successfully recover the costs of apple production.

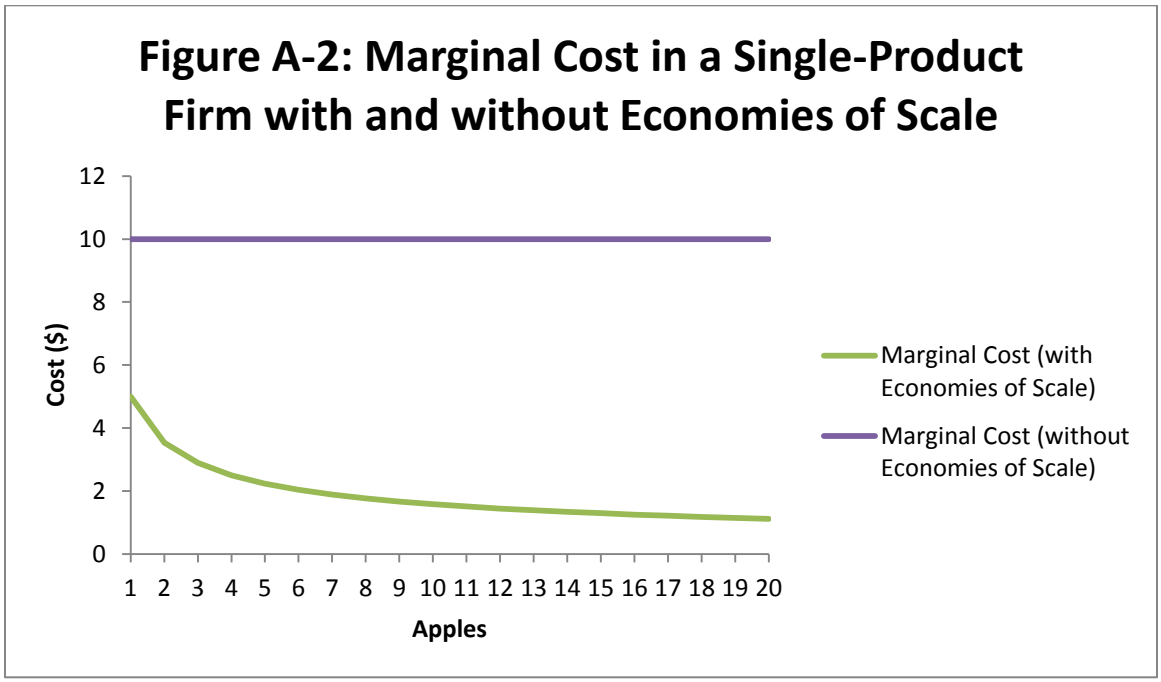
If the farmer's business is a going concern, the farmer may choose to expand the output of apples. As the farmer expands production, hiring more specialized laborers for each element of apple production (planting, growing, harvesting, sales), the farmer finds that the marginal cost of each apple is declining because the laborers are more productive in their individual roles. As a result, the farmer's cost function changes to the following:

$$TC_2 = 500 + (10A^{.5})$$

This cost function represents the economies of scale the farm now possesses, with a marginal cost function of the following:

$$MC_2 = \frac{\partial TC_2}{\partial A} = \frac{5}{\sqrt{A}}$$

This is represented by Figure A-2 below, contrasting the different marginal cost functions:



The cost function described above is also known as a **constant elasticity** cost function. This function assumes that the percentage change in cost with respect to the percentage change in volume is constant at every level of volume, which is useful for modeling economies of scale and estimating costs easily.

II. ATTRIBUTABLE COSTING IN A MULTI-PRODUCT FIRM

Suppose now that the farmer has been successful in the apple business and now wants to expand to the production of strawberries. To do so, the farmer purchases additional machinery, hires some additional workers, and shifts some other workers' hours to produce strawberries. As a result, the farmer's business now has two sources of costs: apple production and strawberry production, with separate variable cost functions that can be added together to create a total cost function for the entire enterprise:

$$TC_3 = 1000 + (10A^{.4}) + (8S^{.4})$$

In this function, 1000 represents the fixed costs of maintaining the business, half of which ($500) results exclusively from the production of strawberries, and $8S^{.4}$ is the additional cost of producing each strawberry. The cost function of the apples changed as well, as it now has a slightly lower elasticity. This is attributable to **economies of scope** (the benefits a multi-product firm reaps from production of two or more goods), as practices applied from apple-growing can be applied to strawberry-growing, and the production of different goods allows for crop rotation, saving the soil and improving yields.

Multi-product firms also now have **common costs**, which are costs that are incurred by both products. These costs may be fixed or variable. Common variable costs are costs that are shared by multiple products but do not directly vary with any those products.[1] They result from economies of scope. A multi-product firm will also have common fixed costs, which are the costs incurred by multiple products (usually the fixed costs associated with starting the firm). In a single-product firm, because these costs directly support the output of the firm, they can be included in the analysis of profitability. In a multi-product firm, however, these costs do not directly relate to one product, so including them in a product's analysis of profitability is inappropriate because they are not caused by the product. New and revised cost concepts are necessary for a multi-product firm.

In a multi-product firm, marginal cost remains the change in cost resulting from the production of an additional good (fruit). However, in a multi-product firm, which possesses common variable costs, marginal costs also measure the change in those costs that result from the addition of a single apple or strawberry into production.

[1] Single-product firms do not have common variable costs, because all variable costs are caused by the one product produced.

However, as before, it does not include common fixed costs. The marginal cost functions for each product are displayed below:

$$MC_{3A} = \frac{\partial TC_3}{\partial A} = \frac{4}{A^{.6}}$$

$$MC_{3S} = \frac{\partial TC_3}{\partial S} = \frac{3.2}{S^{.6}}$$

Average total cost does not function in a multi-product firm the same as it does for a single-product firm because multi-product firms possess common costs which are not directly related to a single product. With average total cost not applying to a multi-product firm, the farmer needs new costing definitions to determine how to recover costs. To determine this, the farmer realizes that a second increment exists in production in a multi-product firm, and that is the product-level increment. Therefore, the marginal cost formula above can be reconstructed as the following formula:

$$MC_s = \frac{dy}{ds} TC(S)$$

In this situation, the marginal cost function measures the change in total costs resulting from the addition of strawberries (which itself is made up of multiple units of volume). If the cost function accurately represents the total cost of the firm, this product-level marginal cost represents the entire set of costs caused by the addition of a product. This product-level marginal cost is also known as **incremental cost** (IC), and is the standard that should be set for cost causality. Put simply, incremental costs are those costs that result from providing a product. In this example, the incremental costs of the strawberries would be all of the costs directly incurred by provision of the strawberries, which can also be represented by the following equation:

$$IC_O = TC - TC(without\ Strawberries) = 500 + (8S^{.4})$$

In this example, a $500 cost that the farmer would not have incurred otherwise was directly incurred from purchasing additional machinery for strawberries, as well as the direct variable costs from strawberry production. Conversely, the incremental cost for apples is represented by the following equation:

$$IC_A = TC - TC(without\ Apples) = (10A^{.4})$$

In this example, the $500 cost of the original cost function contains costs that are used in the production of both apples and strawberries (*e.g.,* inventory software), and therefore these costs do not directly result from the provision of apples.

Product-based costing, however, is not the only way to determine the costs of products. Many firms cannot easily or effectively develop cost functions for entire products, given the various elements involved in production. Many multi-product firms use **activity-based costing**, wherein costs are grouped by cost activity rather than by product. The Postal Service uses a form of activity-based costing.

Suppose the farmer decides to use activity-based costing to more easily determine costs. The farmer groups the enterprise into four costing groups: crop planting, crop growing, crop harvesting, and sales/administration. The farmer determines that these cost groups (or components) have the following cost functions:

$$C_P = (30D^{.3})$$

$$C_G = (10D^{.6})$$

$$C_H = 400 + (30D^{.4})$$

$$C_S = 600 + (20D^{.1})$$

In this example, *D* is the driver of costs for that cost component. For most firms, the driver for a cost component will be its volume, as it has the most direct relation to the costs incurred. For some components, however, other cost drivers may be used (*e.g.,* labor hours or gallons of water). For the farmer, volume (*i.e.,* number of apples or strawberries) is the cost driver for planting and harvesting, while gallons of water is the cost driver for growing, and labor hours is the cost driver for sales. The farmer then determines the percentage of each cost driver attributable to each product, known as a **distribution key.**

Suppose that the distribution keys and related components are the following:

Cost Driver	**Related Component**	**Percent Apples**	**Percent Strawberries**
Volume	Planting, Harvesting	50%	50%
Labor Hours	Sales	70%	30%
Gallons of Water	Growing	40%	60%

Given the above cost functions, the marginal cost curves in the below figures would result. The marginal cost curves are also broken up by their distribution key:

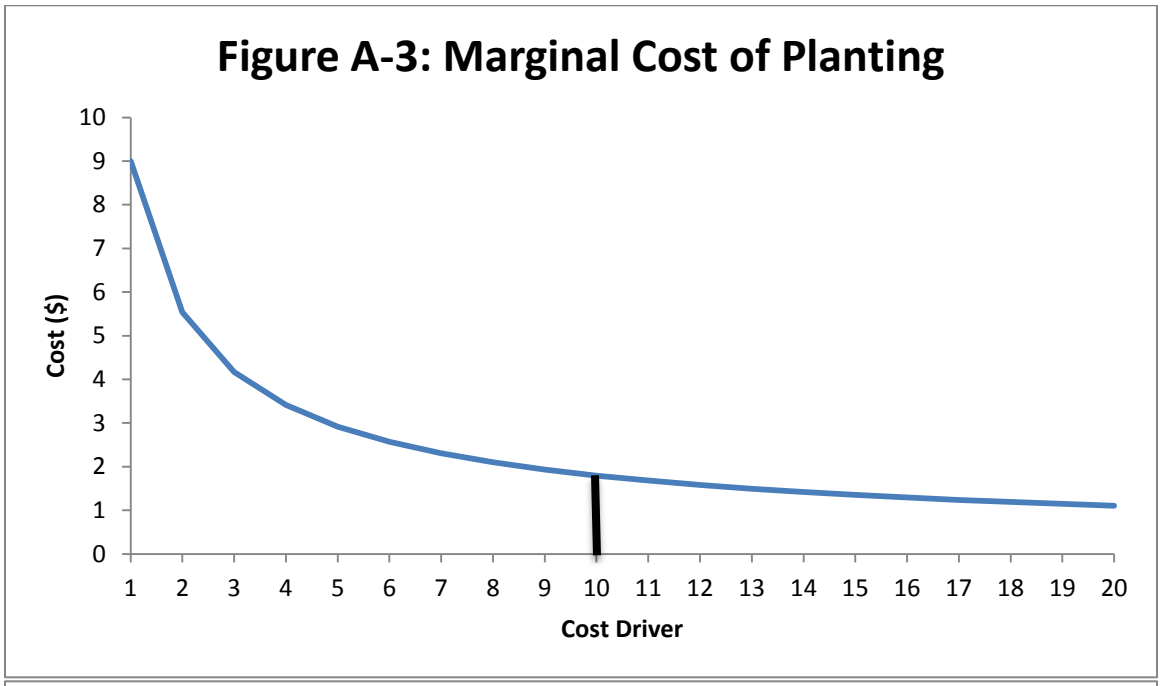


Figure A-3: Marginal Cost of Planting
Cost ($)
0
1
2
3
4
5
6
7
8
9
10
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Cost Driver

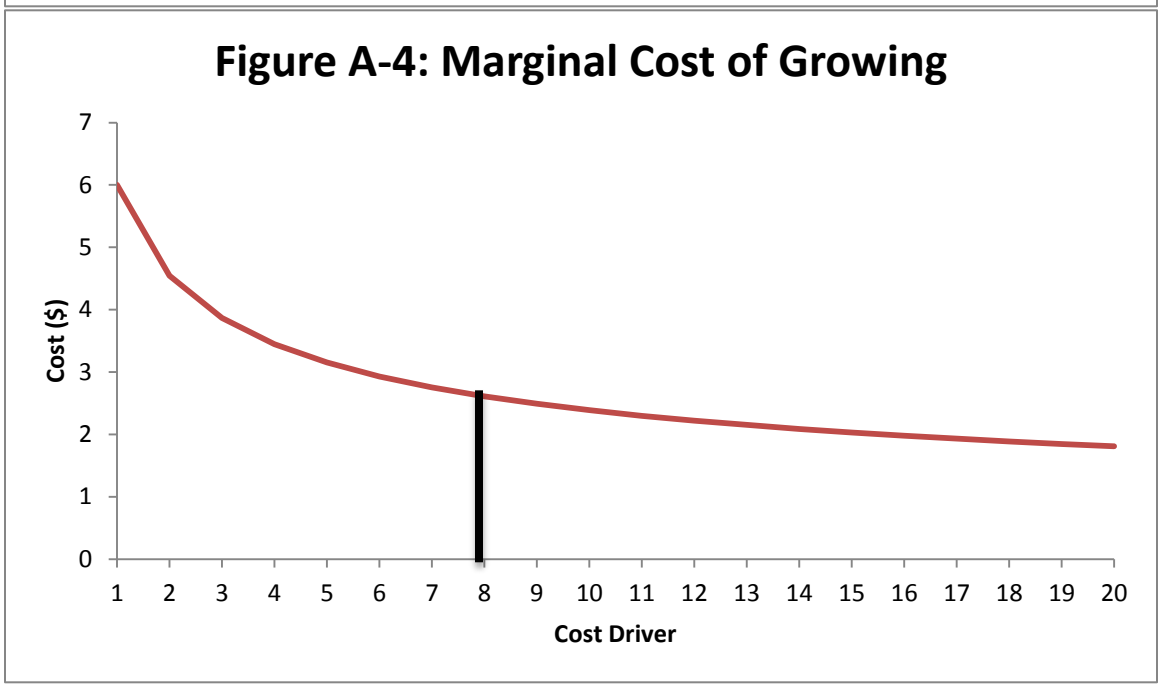


Figure A-4: Marginal Cost of Growing
Cost ($)
0
1
2
3
4
5
6
7
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Cost Driver

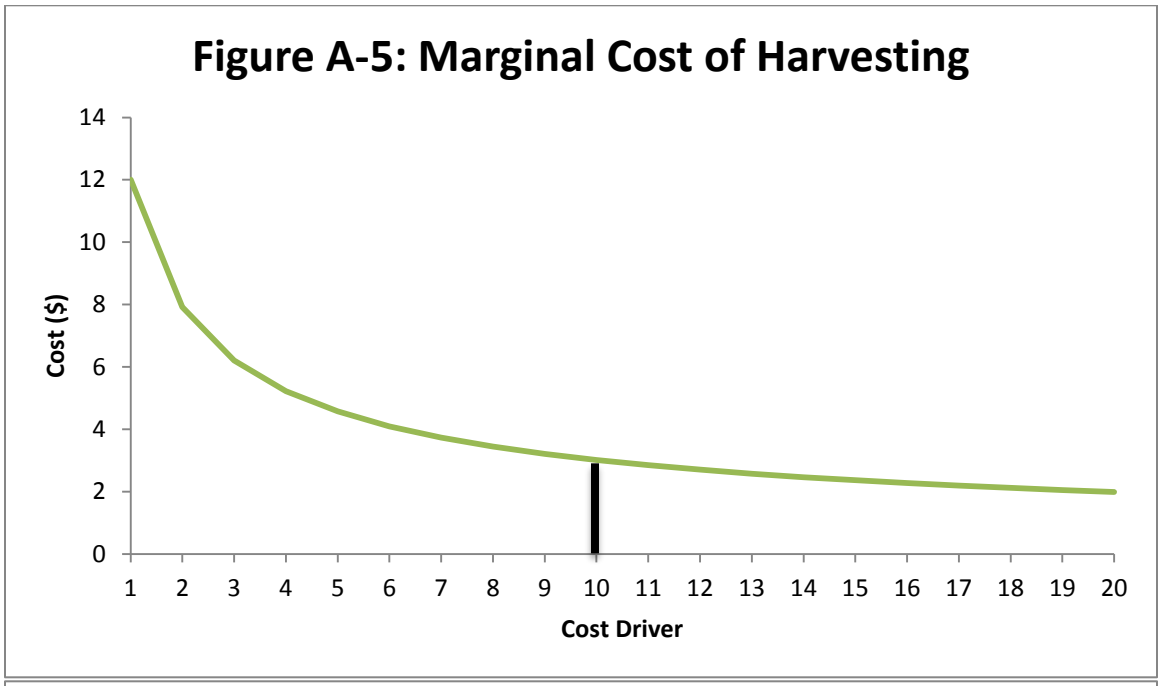


Figure A-5: Marginal Cost of Harvesting
Cost ($)
0
2
4
6
8
10
12
14
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Cost Driver

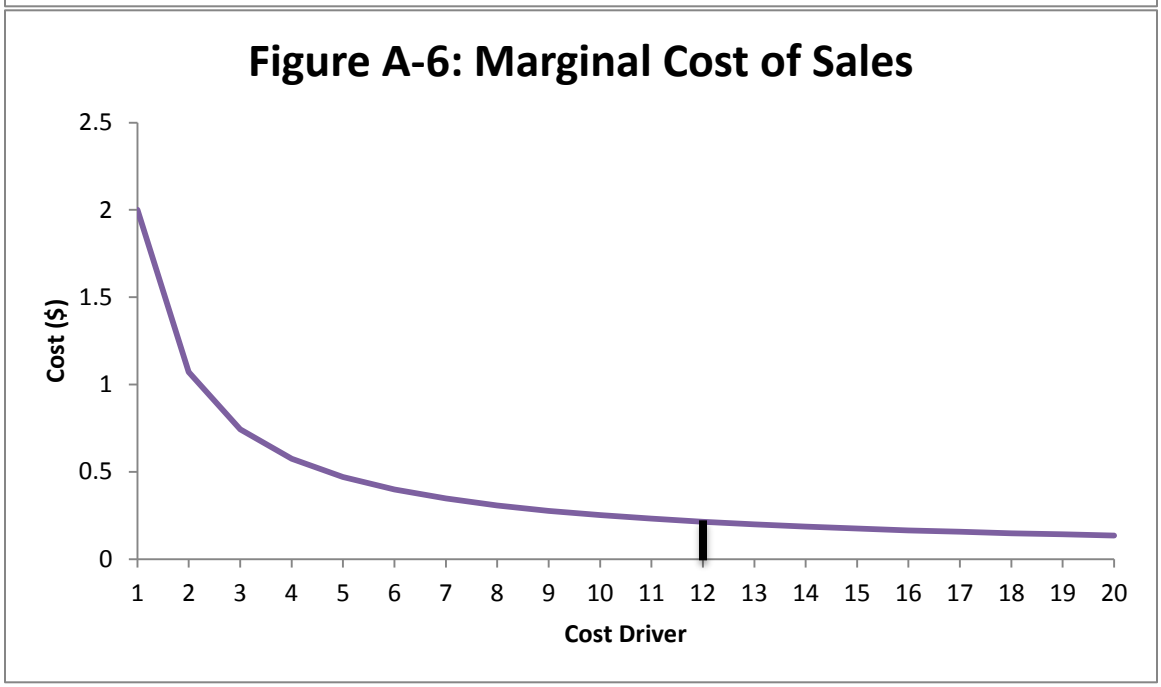


Figure A-6: Marginal Cost of Sales
Cost ($)
0
0.5
1
1.5
2
2.5
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Cost Driver

The area to the right of the black line in each of the above figures represents the incremental cost of strawberries for the given cost component because those are the costs that result from providing strawberries. Those component costs are then summed together to create the incremental cost for strawberries. In this way, the farmer can determine how much of her costs are caused by the introduction of strawberries. The incremental cost of the strawberries can be interpreted as the sum of the marginal costs of each strawberry and can therefore be used for marginal analysis of the entire product. The farmer would use the same process to determine the incremental cost of apple production, determining the incremental, or avoided, costs of not producing apples while still producing strawberries based on the distribution keys of the cost components. This, in effect, assumes that strawberries are the initial output of the farm.

Through the usage of incremental costing, the farmer can determine the costs incurred by each of her products. With that knowledge, the farmer can determine which products are profitable, because the incremental cost is effectively the marginal cost of the entire product. A profitable product is one whose revenue exceeds its incremental cost.

Of course, this is an idealized model of a firm with perfect knowledge of consumer demand, supply chain, productivity, etc. Real-world firms do not know the entire cost function of their cost components nor do they know how it may change given changes in the prices of inputs (*e.g.,* wages, water prices, etc.). Real-world firms cannot assume constant elasticity of their cost functions, and their cost components may have multiple cost drivers with differing effects. Therefore, they must rely on models, estimations, and approximations to determine the marginal and incremental costs of their products. In the next section, this Appendix transitions from the example above to the Postal Service itself, and how it determines product costs.

III. COST ATTRIBUTION IN THE POSTAL SERVICE

The Postal Service, like the farm described above, is a multi-product firm that uses activity-based costing for determining the costs of its products. The Postal Service breaks its costs into 20 cost segments, which are further broken down into hundreds of cost components.

Section 3633(a)(2) of title 39 states that the Postal Service's competitive products must cover their attributable costs.[2] Section 3622(c)(2) clarifies that attributable costs are those costs which are established through "reliably identified causal relationships." *Id.* § 3622(c)(2). This discourages arbitrary allocations of costs to products by requiring causality between the cost component and the product in question. The Postal Service determines component causality using cost drivers. As discussed above, cost drivers are inputs to production that are causally related to the costs of production and do not necessarily have to be volume of output.

Because the Postal Service does not have perfect knowledge of its costs or the ability to create a single cost function for its output, it established a four-step process for determining cost, reproduced from Appendix H of the FY 2015 Summary Description of USPS Development of Costs by Segment and Components below:[3]

1. Divide Costs Among Segments and Components

   Costs are divided up into components for analysis. Accounting costs are first divided among 18 cost segments. The segments are then further divided into identifiable cost components and then into elements, each

[2] 39 U.S.C. § 3633(a)(2). It is not a requirement that market dominant products cover their attributable costs, merely 1 factor out of 14 in evaluating the prices for market dominant products.

[3] Summary Description of USPS Development of Costs by Segment and Components, Fiscal Year 2015, July 6, 2016, file "SUMDES15.zip," file "APPH-15.docx."

representing a discrete activity; there are over a hundred components and many more elements.

2. Identify a Cost Driver and Find Volume-Variable Costs

For each cost element, a cost driver is identified that reflects the essential activity of that element. For example, the cost driver for Inter-NDC highway transportation is cubic-foot-miles. The volume-variable cost pool is then found by using the relationship between the element's cost and its cost driver. The relationship is first used to create volume-variable costs according to methods described below.

3. Distribute Costs to Products

After the pool of volume-variable costs is determined, it is distributed to the various products. These methods of distribution are also discussed below.

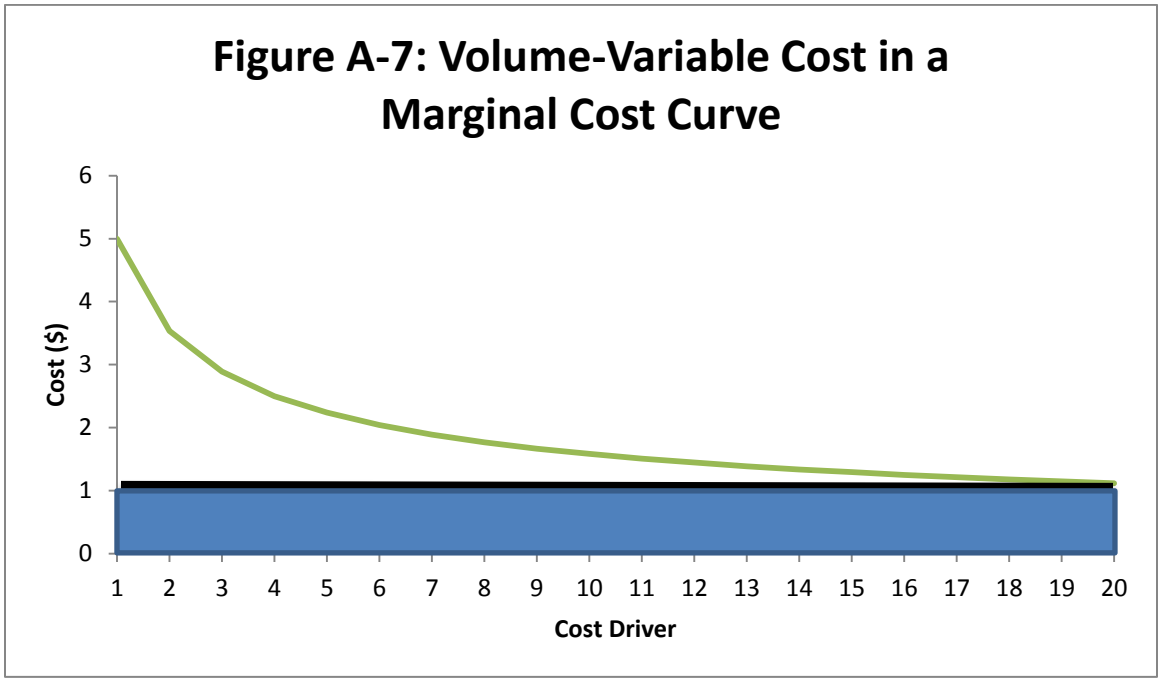
4. Calculate Unit Volume-Variable Cost

Total volume-variable cost for each product is determined by summing the volume-variable costs for that product across components. Unit volume-variable costs are then found by dividing a product's total volume-variable costs by its originating volume.

This process results in the production of volume-variable costs, which are the costs of the component that vary directly with volume. Volume-variable cost is calculated through the below formula:

$$VVC_i = TC_i \varepsilon_i$$

ε represents the elasticity, or variability, of a cost component. That is, it measures the extent to which a component's costs change with respect to volume. This variability is determined through a variety of ways: econometric modeling, expert judgment, costing systems, etc. Components that use an econometric model or costing systems may have variabilities that change annually. If a component has no variability, it has no relationship with volume and is considered institutional. The volume-variable costs can be represented visually on the marginal cost curve, as shown in Figure A-7 below:



The area in blue represents the volume-variable costs of the component. After volume-variable costs are determined as described above, the Postal Service calculates unit volume-variable costs for each product by dividing the volume-variable cost by the number of cost drivers, as shown in the equation below:

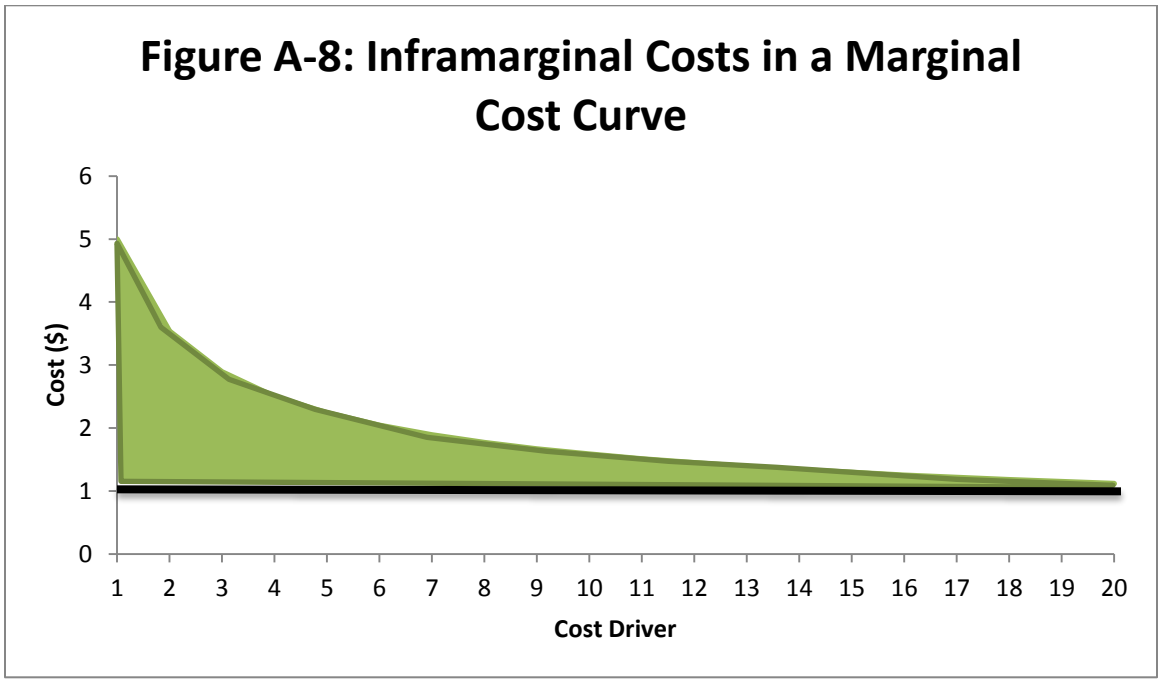
$$UVVC_i = \frac{VVC_i}{D_i}$$

Unit volume-variable cost has been demonstrated to be equivalent to the marginal cost for a given product and can therefore be used for marginal analysis and for pricing. Panzar Comments, Exhibit 2 at 14-15.

The Postal Service has historically also recognized product-specific fixed costs as part of attributable costs. These are costs that do not vary with volume but are causally related to products as a whole.

After costs have been attributed to products, there remain residual costs (also known as institutional costs). These are costs that are not causally related to products under section 3633(a)(2) of title 39 and generally are comprised of two elements: fixed common costs and inframarginal costs. *See* 29 U.S.C. § 3633(a)(2). Fixed common costs are costs that do not vary with volume and are not causally related to any product.

Inframarginal costs are costs that result from economies of scale and scope. They are variable costs that do not vary with volume, and they are unique to postal costing. They contain both common variable costs and the costs that result from economies of scale. These costs have effectively been treated as institutional costs. In a marginal cost curve, these are the costs remaining after volume-variable costs have been calculated, as shown in the green area in Figure A-8 below.

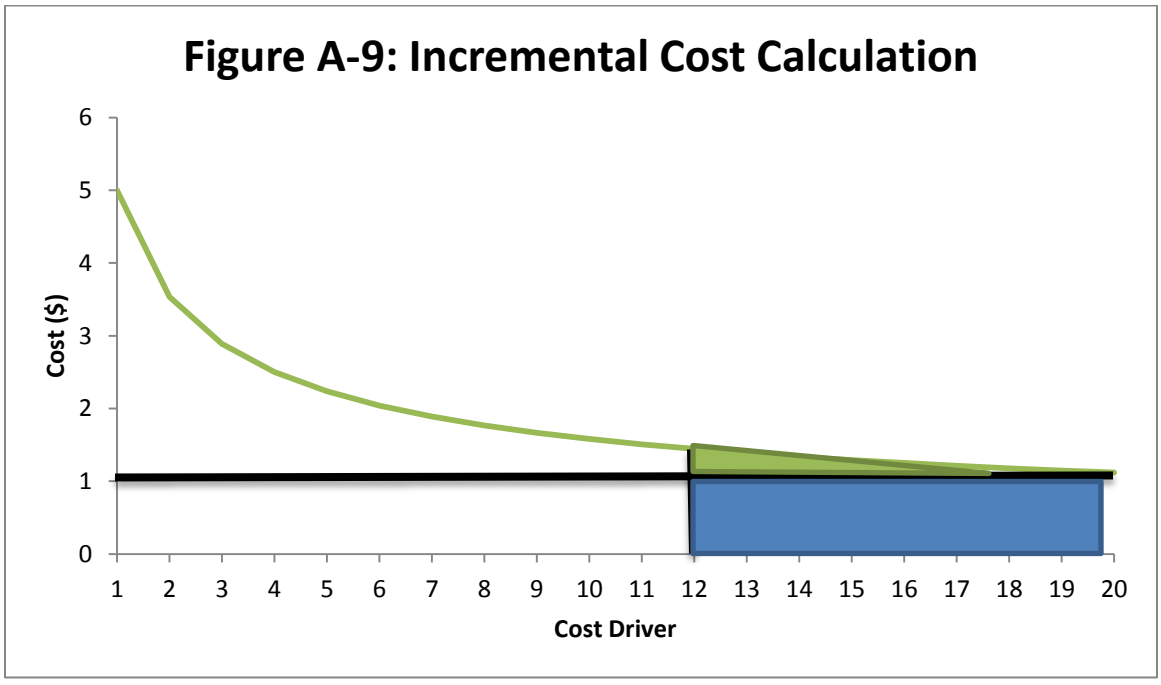


IV. POSTAL SERVICE APPLICATION OF INCREMENTAL COSTING

Section 3633(a)(1) of title 39 requires that competitive products not be cross-subsidized by market dominant products, and the Commission has implemented an incremental cost test to ensure that they are not. 39 U.S.C. § 3633(a)(1). A product is cross-subsidized when it is unable to cover its own costs, and its price may be artificially low, subsidized by a firm's other products (in this case, market dominant mail). This test estimates the incremental cost for competitive products as a whole to determine their profitability. The current methodology for this test was approved in Order No. 399, and is discussed below.[4]

[4] *See* Docket No. RM2010-4, Order Accepting Analytical Principles Used in Periodic Reporting (Proposals Twenty-Two through Twenty-Five), January 27, 2010 (Order No. 399).

The Postal Service begins its incremental cost test by calculating the volume-variable and product-specific fixed costs of a component, based on the C report of the CRA, and then calculates the portion of inframarginal costs that would be avoided by not providing that product in the component. It calculates these inframarginal costs by applying a constant elasticity assumption to those cost functions which are not fully attributable or fully institutional (as they are the only components with inframarginal costs). This assumption has been demonstrated to work at small levels of volume, as done for the Postal Service's competitive products.[5] It then sums those components into product-level incremental costs. Notably, it does not calculate incremental costs for international mail, as its cost pools are not sufficiently disaggregated by competitive and market dominant products. This calculation is graphically depicted in Figure A-9 below:



[5] Michael D. Bradley, Jeff Colvin, & John C. Panzar, *Issues in Measuring Incremental Cost in a Multi-Function Enterprise*, in Managing Change in the Postal and Delivery Industries 3-21 (Michael A. Crew & Paul R. Kleindorfer eds., 1997).

In this example, assume that competitive products make up 40 percent of this cost component's cost driver, as represented by the black line above the 12. The component volume-variable costs attributed to competitive products are represented in the blue area, as 40 percent of the total component volume-variable costs. The Postal Services then calculates the component inframarginal costs that would be removed if competitive products were not to be provided, as represented by the area in green. The sum of those two areas represents the component-level incremental costs of the product.

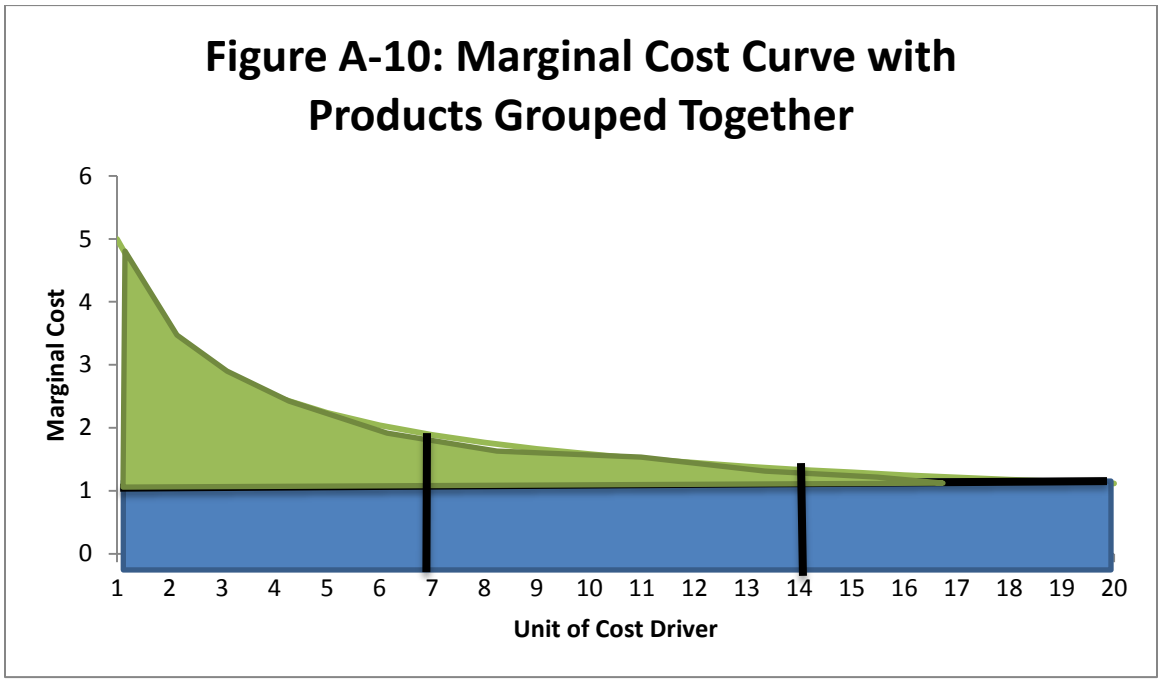
V. THE ORDERING QUESTION IN INCREMENTAL COSTING

The incremental cost test, by definition, tests the change in total cost from providing a product, just as marginal cost examines the change in total cost from providing a piece of mail. The product whose incremental cost is being calculated is assumed to be at the end of the marginal cost curve because it is being added to the mix of products the Postal Service provides. Furthermore, this assumption would apply to any product whose incremental cost is being calculated, whether market dominant or competitive.

Additionally, even if the order were to change (that is, one were to assume that the product tested comes first on the marginal cost curve), the outcome would be the same. Incremental cost is calculated by the following expression:

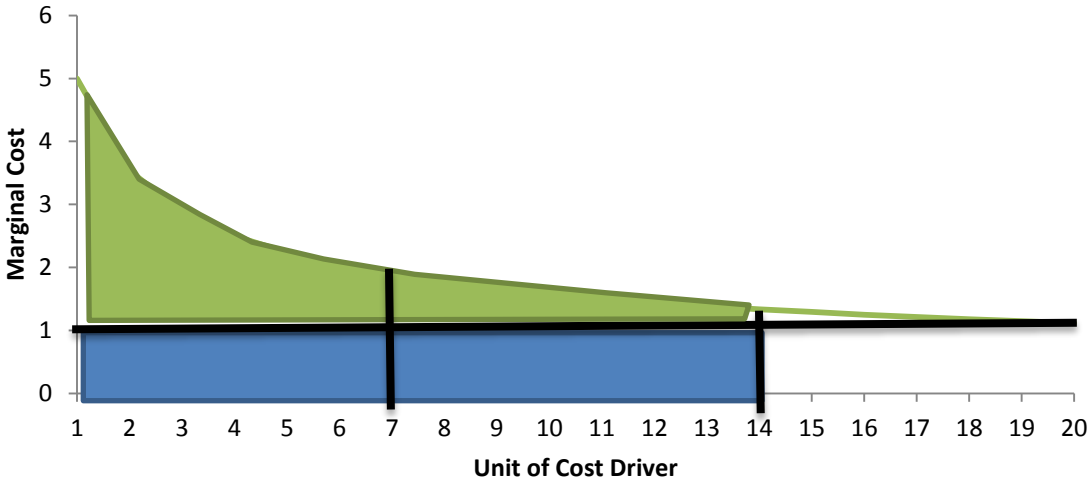
$$IC_i = TC_j - TC_{j-i}$$

Where *TC* is total cost, *i* is a given product, and *j* is the set of all products. If the Postal Service were to be represented by a single constant elasticity cost curve, with the products grouped together as cost drivers, it would appear as illustrated in Figure A-10, shown below:

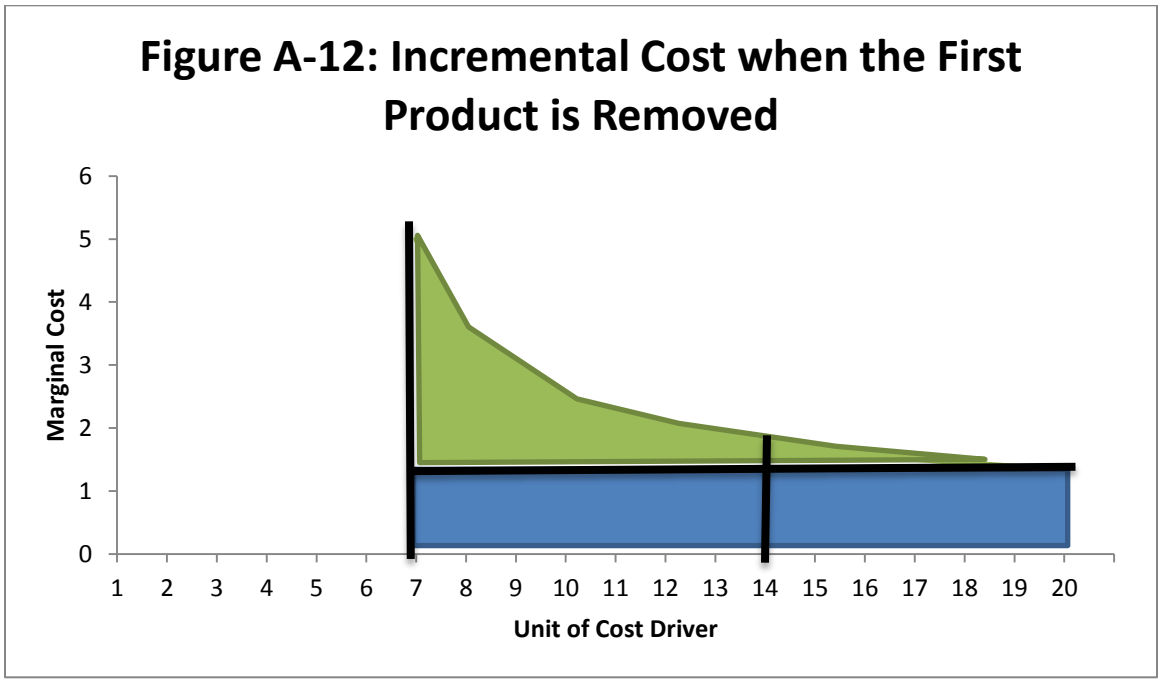


The incremental cost test would normally remove the last product on the curve to determine the incremental cost of that product, as shown in Figure A-11 below:

Figure A-11: Incremental Cost when the Last Product is Removed



The area that was once shaded is the incremental cost of providing that product because it is the difference between the two figures. Suppose, however, that the first product on the curve is removed to test its incremental cost. Because it has the same amount of cost driver as the last product, it will have the same incremental cost. This is because the incremental cost tests acts as though those units of cost driver were never provided. Because they were not provided, the next units of cost driver on the curve would not possess the economies of scale and scope they would have had those earlier units been provided. Effectively, the marginal cost curve would start at the seventh unit of cost driver, as shown in Figure A-12 below:



Whether the first set of cost drivers or the last set of cost drivers is removed, the area under the curve, the incremental cost, remains the same because the calculation of incremental cost test is a difference test: the difference between the total cost of the enterprise and the total cost without one product.

APPENDIX B

A SAMPLE OF THE REVISED COMPONENT GROUP COSTS TABLE FOR THE SUMMARY DESCRIPTION OF COSTS REPORT

Table B-1 below illustrates the information the Commission directs the Postal Service to provide in section V.D of this Order. Currently each of the 17 cost segment sub-reports (*e.g.,* Cost Segment 15, Building Occupancy), in the Component Group Costs subsection (*e.g.,* 15.0.2) includes a table with both accrued costs and attributable costs specified by component group. Under the first and second Commission requirements identified in section V.D. of this Order, the updated table should include additional rows and columns provided in Table B-1 using Cost Segment 15 as an example (blue font indicates the newly required information). Under the third Commission requirement, the source from the preceding year's Annual Compliance Report should accompany the provided information.

Table B-1

Fiscal Year (FY) 2015 Segment 15 Component Group Costs

Component Group/Component		FY 2015 Costs (Thousands)			
	Accrued	Attributable[1]			Other
		Overall Attributable	Volume-Variable	Product-Specific	
15.1 Rents	$930,764	$930,764	$930,614	$150	$0
0165 Rents	$930,614	$930,614	$930,614	$0	$0
0234 Product-Specific Rents	$150	$150	$0	$150	$0
15.2 Fuel and Utilities	$629,670	$381,251	$381,251	$0	$248,419
0166 Fuel	$75,818	$45,906	$45,906	$0	$29,912
0167 Utilities	$553,851	$335,344	$335,344	$0	$218,507
0235 Product-Specific Utilities	$0	$0	$0	$0	$0
15.3 Communications and Other Expenses	$304,655	$78	$0	$78	$304,576
0168 Communications	$85,640	$78	$0	$78	$85,562
0169 Building Projects Expense	$218,931	$0	$0	$0	$218,931
0170 Moving Expense	$83	$0	$0	$0	$83
Total	$1,865,088	$1,312,093	$1,311,865	$228	$552,995

Source: Docket No. ACR2015, Library Reference USPS-FY15-31, December 29, 2015, worksheet "FY15.B.Public," tab "CS15."

[1] As discussed in section IV.C of this Order, the Commission finds it appropriate to interpret a product's attributable costs to mean its incremental costs. Therefore, in future Summary Description of Costs reports, total attributable costs should reflect the inclusion of some inframarginal costs as outlined in section IV.C.

APPENDIX C

CHAIRMAN'S INFORMATION REQUESTS AND RESPONSES TO CHAIRMAN'S INFORMATION REQUESTS

Chairman's Information Request	Citation Short Form	Response to Chairman's Information Request	Citation Short Form
Chairman's Information Request No. 1, November 20, 2015	CHIR No. 1	United Parcel Service, Inc.'s Response to Chairman's Information Request No. 1, December 15, 2015[1]	UPS Response to CHIR No. 1
Chairman's Information Request No. 2, November 20, 2015	CHIR No. 2	Responses of the United States Postal Service to Questions 1-4 of Chairman's Information Request No. 2, December 10, 2015	Postal Service Response to CHIR No. 2
Revised Chairman's Information Request No. 3, November 24, 2015[2]	CHIR No. 3	United Parcel Service, Inc.'s Response to Chairman's Information Request No. 3, December 10, 2015[3]	UPS Response to CHIR No. 3

[1] UPS's response to CHIR No. 1 was originally filed on December 10, 2015. United Parcel Service, Inc.'s Response to Chairman's Information Request No. 1, December 10, 2015. On December 15, 2015, UPS filed an errata and a corrected version of its response to CHIR No. 1. Errata Notice of United Parcel Service, December 15, 2015; UPS Response to CHIR No. 1. In addition, UPS filed a motion for extension of time to file its response to CHIR No. 1. United Parcel Service, Inc.'s Motion for Extension of Time to Respond to Chairman's Information Requests One and Three, November 30, 2015 (UPS Motion). The Presiding Officer granted the UPS Motion. Notice of the Acting Chairman Designating Presiding Officer and Ruling on Motion for Extension, December 1, 2015 (Presiding Officer's Ruling on UPS Motion).

[2] Chairman's Information Request No. 3 was issued on November 24, 2015. Chairman's Information Request No. 3, November 24, 2015. In order to correct question 5a, a revised CHIR No. 3 was issued on the same day. CHIR No. 3.

[3] On November 30, 2015, UPS filed a motion for extension of time to file its response to CHIR No. 3. UPS Motion; *see* Presiding Officer's Ruling on UPS Motion.

Chairman's Information Request	Citation Short Form	Response to Chairman's Information Request	Citation Short Form
Chairman's Information Request No. 4, December 17, 2015[4]	CHIR No. 4	United Parcel Service, Inc.'s Response to Chairman's Information Request No. 4, January 8, 2016	UPS Response to CHIR No. 4
Chairman's Information Request No. 5, December 18, 2015	CHIR No. 5	United Parcel Service, Inc.'s Response to Chairman's Information Request No. 5, January 8, 2016	UPS Response to CHIR No. 5
Chairman's Information Request No. 6, December 23, 2015	CHIR No. 6	Response of the United States Postal Service to Question 1 of Chairman's Information Request No. 6, January 8, 2016	Postal Service Response to CHIR No. 6
Chairman's Information Request No. 7, February 24, 2016	CHIR No. 7	Responses of the United States Postal Service to Questions 1-3 of Chairman's Information Request No. 7, March 2, 2016[5]	Postal Service Response to CHIR No. 7

[4] On December 18, 2015, UPS filed a request for extension of time to respond to CHIR No. 4. *See* United Parcel Service, Inc.'s Motion for Extension of Time to Respond to Chairman's Information Request Four, December 18, 2015. On December 21, 2015, Amazon filed a response to UPS's motion requesting an extension of the comment deadline should UPS's motion be granted. *See* Response of Amazon Fulfillment Services, Inc., to Motion of United Parcel Service, Inc. for Extension of Time to Respond to Chairman's Information Request No. 4, December 21, 2015. On December 22, 2015, the Presiding Officer in this docket granted UPS's motion for an extension but determined Amazon's request to extend the comment deadline was premature. Presiding Officer's Ruling Granting Motion for Extension, December 22, 2015, at 2.

[5] The Postal Service filed a non-public library reference in conjunction with its response to CHIR No. 7. Notice of the United States Postal Service of Filing of USPS-RM2016-2/NP2, March 2, 2016.

APPENDIX D

COMMENTS AND REPLY COMMENTS

Commenter	Citation	Citation Short Form
Amazon Fulfillment Services, Inc. (Amazon)	Comments of Amazon Fulfillment Services, Inc., January 27, 2016[1]	Amazon Comments
Amazon	Reply Comments of Amazon Fulfillment Services, Inc., March 25, 2016	Amazon Reply Comments
Sander Glick on behalf of Amazon (Glick)	Declaration of Sander Glick on Behalf of Amazon Fulfillment Services, Inc., January 27, 2016	Glick Comments
John C. Panzar on behalf of Amazon (Panzar)	Declaration of John C. Panzar on Behalf of Amazon Fulfillment Services, Inc., January 29, 2016[2]	Panzar Comments
Panzar	Reply Declaration of John C. Panzar on Behalf of Amazon Fulfillment Services, Inc., March 25, 2016	Panzar Reply Comments
T. Scott Thompson on behalf of Amazon (Thompson)	Declaration of T. Scott Thompson on Behalf of Amazon Fulfillment Services, Inc., January 27, 2016	Thompson Comments
American Catalog Mailers Association (ACMA)	Initial Comments of the American Catalog Mailers Association, January 27, 2016	ACMA Comments
Greeting Card Association (GCA)	Reply Comments of the Greeting Card Association, March 25, 2016	GCA Reply Comments

[1] In conjunction with its initial comments, Amazon filed two public library references. Notice of Amazon Fulfillment Services, Inc. of Filing of Library References AFSI-LR-RM2016-2/1 and AFSI-LR-RM2016-2/2, January 27, 2016.

[2] The Panzar Comments, filed January 29, 2016, are a corrected version. Amazon filed an errata to Panzar's initial comments of January 27, 2016. Errata Notice of Amazon Fulfillment Services, Inc., January 29, 2016; *see* Declaration of John C. Panzar on Behalf of Amazon Fulfillment Services, Inc., January 27, 2016.

Commenter	Citation	Citation Short Form
American Catalog Mailers Association, Inc., Alliance of Nonprofit Mailers, Continuity Shippers Association, Envelope Manufacturers Association, Greeting Card Association, National Association of Presort Mailers, Parcel Shippers Association, PSI Systems, Inc., and Stamps.com (Market Dominant Mailers)	Comments of American Catalog Mailers Association, Inc., Alliance of Nonprofit Mailers, Continuity Shippers Association, Envelope Manufacturers Association, Greeting Card Association, National Association of Presort Mailers, Parcel Shippers Association, PSI Systems, Inc., and Stamps.com ("Market Dominant Mailers"), January 27, 2016	Market Dominant Mailers Comments
National Newspaper Association (NNA)	Reply Comments of National Newspaper Association, March 25, 2016	NNA Reply Comments
National Association of Letter Carriers, AFL-CIO (NALC)	Reply Comment of the National Association of Letter Carriers, AFL-CIO, March 24, 2016	NALC Reply Comments
National Postal Policy Council (NPPC)	Comments of the National Postal Policy Council, January 27, 2016	NPPC Comments
Parcel Shippers Association (PSA)	Comments of the Parcel Shippers Association, January 27, 2016	PSA Comments
Public Representative	Public Representative Comments, January 27, 2016[3]	PR Comments
Public Representative	Public Representative Reply Comments, March 25, 2016[4]	PR Reply Comments

[3] The Public Representative filed an errata to his initial comments of January 27, 2016. Public Representative Notice of Errata to Public Representative Comments, February 18, 2016.

[4] The Public Representative filed an errata to his reply comments of March 25, 2016. Public Representative Notice of Errata to Public Representative Reply Comments, March 29, 2016.

Commenter	Citation	Citation Short Form
United States Postal Service (Postal Service)	Initial Comments of the United States Postal Service on UPS Proposals One and Two, January 27, 2016[5]	Postal Service Comments
Postal Service	Reply Comments of the United States Postal Service on Proposals One and Two, March 25, 2016	Postal Service Reply Comments
United Parcel Service, Inc. (UPS)	Reply Comments of United Parcel Service, Inc. Regarding UPS Proposals One and Two, March 25, 2016[6]	UPS Reply Comments
Valpak Direct Marketing Systems, Inc. and Valpak Dealers' Association, Inc. (Valpak)	Valpak Direct Marketing Systems, Inc. and Valpak Dealers' Association, Inc. Initial Comments on United Parcel Service, Inc.'s Proposed Changes to Postal Service Costing Methodologies, January 27, 2016	Valpak Comments
Valpak Direct Marketing Systems, Inc. and Valpak Franchise Association, Inc. (Valpak)	Valpak Direct Marketing Systems, Inc. and the Valpak Franchise Association, Inc. Reply Comments Regarding United Parcel Service, Inc.'s Proposed Changes to Postal Service Costing Methodologies, March 25, 2016	Valpak Reply Comments

[5] On January 13, 2016, the Postal Service filed an uncontested motion for additional time to file comments. Uncontested Motion of the United States Postal Service for Extension of Time to File Initial Comments, January 13, 2016. The Presiding Officer granted the Postal Service's motion. Presiding Officer's Ruling Granting Motion for Extension, January 14, 2016. Additionally, with its initial comments, the Postal Service filed a report by a representative, Michael D. Bradley (Bradley). Postal Service Comments, Analysis of UPS Proposals One and Two, and the Supporting Report of Dr. Kevin Neels, January 27, 2016 (Bradley Comments). In conjunction with its initial comments, the Postal Service filed one public and one non-public library reference related to the Bradley Comments. Notice of the United States Postal Service of Filing of USPS-RM2016-2/1 and USPS-RM2016-2/NP1, January 27, 2016.

[6] In conjunction with its reply comments, UPS filed a report by Neels and a non-public library reference. UPS Reply Comments, Reply Report of Dr. Kevin Neels To Accompany UPS Reply Comments In Docket No. RM2016-2 (Neels Reply Comments); Notice of Filing of Library Reference UPS-RM2016-2/LR-NP2, March 25, 2016.

APPENDIX E

OTHER MOTIONS AND COMMISSION ORDERS ON MOTIONS

Filing Party	Motion	Commission Order on Motion
United States Postal Service (Postal Service)	Uncontested Motion of the United States Postal Service for Access to Materials Filed Under Seal by United Parcel Service, October 9, 2015	Order Granting Unopposed Access to Materials Filed Under Seal by United Parcel Service, October 9, 2015 (Order No. 2750)
United Parcel Service, Inc. (UPS)	United Parcel Service, Inc.'s Uncontested Motion Requesting Continued Access to Non-Public Materials Under Protective Conditions, October 13, 2015	Order Granting Unopposed Request for Continued Access to Non-Public Materials Filed Under Seal, October 15, 2015 (Order No. 2756)
Amazon Fulfillment Services, Inc. (Amazon)	Unopposed Motion of Amazon Fulfillment Services, Inc., for Access to Materials Filed Under Seal by United Parcel Service, Inc. and United States Postal Service, October 16, 2015	Order Granting Unopposed Motion for Access to Materials Filed Under Seal by United Parcel Service and United States Postal Service, October 19, 2015 (Order No. 2765)
Amazon	Unopposed Motion of Amazon Fulfillment Services, Inc., for Access by T. Scott Thompson to Materials Filed Under Seal by United Parcel Service, Inc. and United States Postal Service, November 9, 2015	Order Granting Unopposed Motion for Access to Materials Filed Under Seal by United Parcel Service and United States Postal Service, November 10, 2015 (Order No. 2810)
Amazon	Unopposed Motion of Amazon Fulfillment Services, Inc., for Access by Ai Deng and Ben Mermelstein to Materials Filed Under Seal by United Parcel Service, Inc. and United States Postal Service, November 16, 2015	Order Granting Unopposed Motion for Access to Materials Filed Under Seal by United Parcel Service and United States Postal Service, November 16, 2015 (Order No. 2818)
Amazon	Motion of Amazon Fulfillment Services, Inc., for Issuance of Chairman's Information Request, November 16, 2015	Pertinent questions were incorporated into CHIR No. 1.
Postal Service	Motion of the United States Postal Service Seeking Issuance of Information Requests to United Parcel Service, November 20, 2015	Pertinent questions were incorporated into CHIR No. 3.

Filing Party	Motion	Commission Order on Motion
UPS	Motion of United Parcel Service, Inc. for Issuance of Information Request to the United States Postal Service, December 16, 2015[1]	Pertinent questions were incorporated into CHIR No. 6.
UPS	United Parcel Service, Inc.'s Motion for Access to USPS-RM2016-2/NP1, January 22, 2016	Order Granting Unopposed Motion for Access to Non-Public Materials Filed Under Seal, February 1, 2016 (Order No. 3059)
Amazon	Unopposed Motion of Amazon Fulfillment Services, Inc., for Access to Library Reference USPS-RM2016-2/NP1, January 28, 2016	Order Granting Unopposed Motion for Access to Materials Filed Under Seal by the United States Postal Service, January 29, 2016 (Order No. 3058)
UPS	United Parcel Service, Inc.'s Notice of Filing Additional Certification of Compliance with Protective Conditions, February 2, 2016	Docket No. ACR2015 and Docket No. RM2016-2, Order Granting Access to an Additional UPS Representative, February 3, 2016 (Order No. 3063)
UPS	Motion of United Parcel Service, Inc. for Issuance of Information Request to United States Postal Service, February 19, 2016	Pertinent questions were incorporated into CHIR No. 7.
UPS	United Parcel Service, Inc.'s Motion for Access to USPS-RM2016-2/NP2, March 2, 2016	Order Granting Unopposed Motion for Access to Non-Public Materials Filed Under Seal, March 3, 2016 (Order No. 3127)
Amazon	Unopposed Motion of Amazon Fulfillment Services, Inc., for Access to Library Reference USPS-RM2016-2/NP2, March 4, 2016	Order Granting Unopposed Motion for Access to Materials Filed Under Seal by the United States Postal Service, March 7, 2016 (Order No. 3131)

[1] The Postal Service filed an opposition to UPS's motion of December 16, 2015. Opposition of the United States Postal Service to UPS Motion Seeking Issuance of Information Request to the Postal Service, December 17, 2015. The Acting Chairman accepted the Postal Service's opposition in part. CHIR No. 6 at 1 n.2.

Filing Party	Motion	Commission Order on Motion
Postal Service	Uncontested Motion of the United States Postal Service for Access to UPS-RM2016-2/LR-NP2 Filed Under Seal by United Parcel Service, March 28, 2016	Order Granting Unopposed Motion for Access to Non-Public Materials Filed Under Seal, March 28, 2016 (Order No. 3180)
Amazon	Unopposed Motion of Amazon Fulfillment Services, Inc., for Access to Library Reference UPS-RM2016-2/NP2, March 29, 2016	Order Granting Unopposed Motion for Access to Materials Filed Under Seal, March 30, 2016 (Order No. 3197)